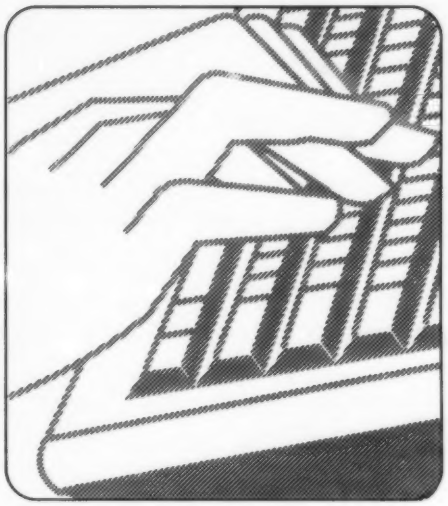
Canadian Centre for Occupational Health and Safety

Centre canadien d'hygiène et de sécurité au travail



REPETITIVE STRAIN INJURIES

A Seminar

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REPETITIVE STRAIN INJURIES

A SEMINAR

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REPETITIVE STRAIN INJURIES

A Seminar

Wednesday, February 27, 1991
Hamilton Convention Centre, Hamilton, Ontario

8:15 am	REGISTRATION AND COFFEE
9:00 am	**Welcome and Introduction to the Seminar** Lillian Vine, Manager, Workshops and Conferences Canadian Centre for Occupational Health & Safety
	Current State of Knowledge and Research Richard Wells, Associate Professor Department of Kinesiology, University of Waterloo
	Compensation Aspects of RSI Geoff Wright, Senior Ergonomics Consultant Clinical and Rehabilitation Services Ontario Workers' Compensation Board
	The Musicians' Clinic and Other Clinical Examples John Chong, Director, Centre for Human Performance and Health Promotion, Sir William Osler Health Institute
	A Union's View on RSI - Prevention and Solutions Gary Cwitco, National Representative Communications & Electrical Workers of Canada
	NCR - Dealing with RSI and Future Plans Joanna Musselman, Manager, Benefits and Employee Relations, Personnel Resources, NCR Canada Ltd
	CCOHS Experiences and Activities Ilene Stones, Project Scientist Andrew Drewczynski, Project Scientist Renzo Bertolini, Project Scientist Medicine, Toxicology and Ergonomics Unit, CCOHS
	Questions and Discussion
4:30 pm	CLOSE OF SEMINAR

EXECUTIVE SUMMARY

The conundrum most commonly but not exclusively called Repetitive Strain Injuries came under close scrutiny February 27 at a one-day seminar in Hamilton organized by CCOHS.

Some 60 participants representing management, labour, government and professionals listened to and exchanged ideas with five specialists in the RSI field.

RSI, participants were told, is a catchall term for a number of disorders of muscles, tendons, and nerves. Much about it is unknown but there was general agreement that enough is known to take action to prevent RSI, to treat it, and to prepare the worker recovering from a repetitive strain injury for a safe return to work.

Richard Wells of the University of Waterloo described RSI's common features: it develops over weeks and months; its symptoms are both specific and non-specific; it is not limited to any one occupational group; it is often unreported.

Geoff Wright of the Ontario Workers' Compensation Board discussed compensation aspects of RSI. He presented a statistical study showing that the auto industry leads the top-10 group in Ontario in RSI-related claims.

John Chong of Hamilton's Sir William Osler Health Institute, a physician and musician, described his experiences with a musicians' RSI clinic. With illustrations from a number of clinical cases, he showed that musicians suffer injuries similar to those suffered by industrial or clerical workers.

Gary Cwitco of the Communications & Electrical Workers of Canada Union said RSI was a "productivity driven" condition that often occurs after the introduction of technological change. He also spoke about a National Research Council project that is working on an RSI bibliography and a "Best Practice Guide."

Joanna Musselman of Kitchener's NCR Corporation described her company's "proactive" program to reduce compensation claims by stressing a preventive approach to RSI-related injuries.

CCOHS staffers Andrew Drewczynski, Renzo Bertolini, and Ilene Stones discussed the Centre's RSI activities in inquiries, publications, workshops and a SOLUTIONS database now in prototype.

INTRODUCTION

Lillian Vine

Welcome to our seminar on Repetitive Strain Injuries. I am Lillian Vine, Manager of Workshops and Conferences for CCOHS, the Canadian Centre for Occupational Health and Safety. CCOHS is the Canadian information resource for occupational health and safety through its inquiries service, its computer databases, and publications. In 1986 we added information delivery in a different way by using the information that came from you in workshops; since then we have expanded into seminars. Using the information you share with us is very much a part of all that we do. You will be hearing about one particular sharing program we are involved in from CCOHS Project Scientist, Ilene Stones.

We bring you outstanding speakers at our workshops and seminars. But we also try to leave ample time for discussion and comments because we want you to share your experiences. Many have told us that this is a very important part of our workshops and seminars--that they are able to voice their concerns and hear other people's concerns and learn from other people's solutions and experiences and make progress in their workplace health and safety programs.

CURRENT STATE OF KNOWLEDGE AND RESEARCH

Lillian Vine

Richard Wells is an Associate Professor of Kinesiology at the University of Waterloo and the Associate Dean of Computing and Special Projects of Applied Health Sciences. He was trained as a Mechanical Engineer at the University of Manchester in England and at McMaster University in Hamilton. Dr Wells has had broad interdisciplinary experience in studying the loadings on the human musculoskeletal system and their relationship to injury.

Dr Wells and his colleagues' current research interests include assessing hand and arm intensive tasks and attempting to relate these motions to musculoskeletal disorders, and developing a health reporting form which will enable better recording of chronic musculoskeletal disorders. Dr Wells was also a speaker at our first repetitive strain injuries workshop in March 1988. He did a brilliant job then; I know he will again.

Richard Wells

I would like to thank Lillian for inviting me here today. It is quite a challenge because I will introduce the issues, the common problems and what we don't know.

Coming from a university environment, it is common to pretend that nothing is known and that more money is needed for research. One can easily fall into the trap of doing nothing and waiting until all the answers are known. But, there is a lot of information which will give us a good start in looking at this very large problem. I want to acknowledge that a lot is known and more has been happening since that first CCOHS workshop in 1988. I also want to talk about the "soft" areas--areas which lead to confusion and which tend to thwart people's attempts at solving musculoskeletal problems that are so common in occupational tasks.

A Swedish study performed some time ago attempted to apportion the causation of occupational diseases in Sweden. It found that fully 55% could be attributed to ergonomic, physical causes. So we are dealing with a problem that is of large magnitude both for the sufferers and for the social and health care systems that have to support them.

Whether we talk about the low back or the upper limbs, I think the issues are the same. Most of what I will talk about today will apply in the area of low back problems, but I will restrict my remarks mainly to upper limb disorders.

"Repetitive strain injuries" is a very broad term and a term that can lead us in a wrong direction. These kinds of disorders of the muscles, bones and skeleton are not new. They have been recognized as far back as occupational health writings go and were undoubtedly present when cavemen were chipping flints from stones. The challenge is to recognize that they are integral

parts of human existence--everyone has some degree of musculoskeletal impairment; the trick is to avoid, as much as possible, the high risk factors involved in some jobs. Mankind has developed, and continues to develop, a vast variety of occupational tasks which challenge the musculoskeletal system. These range from heavy jobs in mining through the automotive industry, the food processing industry, the health care industry to cashiering and clerical jobs.

Unless we have a reasonable idea of what is causing problems, it is very difficult to intervene to stop them from happening. Research has pointed to jobs that require lots of physical activity, long hours, constrained postures, and high forces. The combination of these risk factors--force, repetition, posture, and little rest--will, in all likelihood, lead to cumulative trauma disorder. Almost every job and every activity possesses these problems to some degree. The trick is to identify typical postures that cause problems and in what degree; and secondly, whether these risk factors occur singly (which usually doesn't cause a problem) or whether they occur in combination, which enhances the risk.

Classic risk factors can be enhanced by cold, vibration, unsuitable gloves, and so on. One of the problems is trying to relate generic risk factors to specific problems. When we get into the etiology, I will show you how these risk factors might operate.

The results of these occupational and non-occupational tasks are a wide variety of musculoskeletal disorders, a term I prefer to repetitive strain injuries because it doesn't pin the blame on specific activities and avoids that argument about whether these are "injuries" or "illnesses." When I use the term "work-related musculoskeletal disorders," I am referring to a whole range of problems that occur within the musculoskeletal system. Various terminology is used, such as carpal tunnel syndrome and tendinitis, repetitive strain injuries, and cumulative trauma disorders.

The common feature of most of these terms is that we attribute it to some kind of cumulative exposure. Whether the actual onset is acute or comes on slowly, a common feature of many of these exposures is their cumulative nature. We might define them as disorders of the bones, muscles, nerves or blood vessels that cause aggravated or precipitate problems by continuous static postures or repetitive motions.

Some of the characteristics of most of these work-related musculoskeletal disorders is that they develop over periods of weeks, months or years. We are not talking about acute or traumatic kinds of exposures. Symptoms range from specific to non-specific. They are not limited to occupational groups, which makes it difficult sometimes to attribute cause. And they are often unreported.

If we use an umbrella term such as repetitive strain injuries or work-related musculoskeletal disorders, it is important to realize that under that generalized heading there is a huge number of specific and non-specific injuries. By specific injuries I mean things such as carpal tunnel syndrome (which is an affliction of the nervous system), muscle problems (tension neck, seamstress's neck), and tendon problems (tendinitis). For each of these disorders there is a specific anatomical site. So while we use a broad brush approach, we are actually talking about a great many specific disorders.

A lot of the definitions and a lot of the material in repetitive strain injuries come from Australia. The terminological problem with the Australian work is titles such as "RSI: Myth or reality" or "The Myth of RSI" which leads one to believe that these chronic musculoskeletal problems are under dispute, that they may not be real. If we look at the literature more closely, we see two

common definitions of repetitive strain injury--diagnoses that include all problems (which is how we use the word) or the more Australian way of using it only for problems for which a clinically clear answer cannot be found. "Repetitive strain injuries" by that definition become "problem cases" that don't have clear, clinical signs and symptoms. Whenever you read the Australian literature, that point should be uppermost in your mind. They tend to talk about very different things.

Different body structures are involved--tendons and ligaments, vasculature (blood vessels), nervous tissue, and muscles. Each one of these structures or tissues reacts differently to different kinds of stresses. So what may be good for one may be extremely injurious to another. I will take two specific body areas and talk about them in terms of injury mechanisms. I will try to illustrate to you the kinds of issues involved, what is known, and what is not known. The areas I have chosen for consideration are carpal tunnel syndrome and neck/shoulder problems.

Carpal tunnel is formed in the channel in the wrist bones where the tendons of the fingers pass. Also passing through that passageway is the median nerve which causes some of the fingers and the thumb to move and provides sensation to the thumb-side of the hand. Pressure on that nerve causes symptoms of carpal tunnel--weakness, loss of sensation, numbness and tingling.

Carpal tunnel syndrome is a debilitating condition and it has received a lot of attention. In the United States, it is a very rapidly rising cumulative trauma disorder. Some people suggest that it will soon be second only to low-back pain for compensation. The direction is certainly set in the US for carpal tunnel syndrome to be a major occupational disorder. NIOSH (National Institute of Safety and Health) is spending a lot of time on this disorder because of its reported rapid rate of increase.

The classic literature shows many risk factors for this problem. These were obtained from observation in clinical studies which showed empirical relationships between those who develop these problems and those who do not. There are fairly classic postures--hands held in fixed positions over prolonged periods of time. One of the classic tests for carpal tunnel syndrome is holding the hand in a fixed position for a long time to see if it will replicate the symptoms. These postures form the basis for a preliminary analysis of a lot of work tasks. The factors are exclusively focused on the wrists, which may seem obvious, but I want to develop some alternative policies that suggest that it is not wrists alone we should be looking at when we discuss carpal tunnel syndrome. Complicating this is a large amount of "noise" in the system; cases that may not be due to occupational exposure. There are many factors unrelated to occupational tasks which are risk factors for carpal tunnel syndrome and more are being discovered all the time. For instance, obesity and smoking have recently been found to increase the risks. We are left with a situation that is not very clear-cut.

What work activities and what features of the job cause carpal tunnel syndrome and how might those be ameliorated? Classic risk factors for work-related musculoskeletal disorders are force, posture and repetition. In the case of carpal tunnel, force and posture interact, so if you are exerting force on the tendons that pass through the carpal tunnel at the same time as you place your wrists in a flexed position, those tendons will press against the median nerve and possibly cause changes that would produce symptoms.

Increased force will probably increase the pressure on the carpal tunnel. What causes increased force? Lack of skill in the task may cause it. The wearing of gloves may cause it; gloves cause a lack of touch which may force people to increase their grip strength. Vibration may have an

effect through some of the same mechanisms. One can use these kinds of cause/effect relationships to come up with preventive strategies.

Tendons that pass through the carpal tunnel glide through sheaths called tendon sheaths. If those sheaths become irritated, perhaps because of too much finger movement or finger movements with the wrists in extreme positions, the synovial sheaths may swell and leave less room for the median nerve. So carpal tunnel can be related to the swelling of the tendon sheath. We should look at wrist posture and finger movements, not at wrist posture alone.

Perhaps the problem is not all at the wrists; there are other possibilities. Nerves travel from the spinal cord in the neck all the way down the arm and are subject to both chemical and mechanical forces as they traverse the arm. Carpal tunnel syndrome could be aggravated due to interference with that nerve at a higher level, so called "double crush." So we may be dealing with posture at the shoulder level as well.

There are yet other possibilities. It is well known that pregnant women often experience carpal tunnel syndrome related to edema or water retention in the limbs. That water swells up the tissues in the surrounding area of the carpal tunnel which leaves less room for the median nerve and produces pressure upon it. Perhaps some classic postures--such as that of data entry people who sit in immobile positions for long periods--can lead to edema of the arm due to restriction of lymphatic return and of veinous return.

There are many possibilities and each one can lead to different preventive approaches. Some are concentrated purely on wrist posture; some are concentrated on combinations of wrist posture and finger movements. A suggestion is that as the wrist moves, the nerve is pulled or stretched and many extreme wrist movements can irritate the nerve. If we are not sure of the contributions of these, it makes it very difficult to pinpoint the problem areas. This complicates matters when setting up workplaces that minimize the risks of carpal tunnel.

Even though we can pinpoint obvious problems and eliminate them, a hard core of problems remain. Take for instance supermarket cashiers. There have been many studies that seem to indicate the introduction of scanning devices increases carpal tunnel risk. Why would this task of passing groceries over a scanner increase carpal tunnel? It is a heavily manual-oriented task; there are a lot of movements and repetitions and forces. But these tasks heavily load the shoulders as well. So it becomes less clear whether we should concentrate on arm posture, shoulder region, neck region, or whether we should be looking at all of them. We are still then left with the major question--can we engineer a risk-free grocery scanning workstation?

In Sweden shoulder/neck problems are rapidly approaching back problems and may be overtaking them. Sweden is often regarded as having a lead in ergonomics and certainly awareness is ten years ahead of North America. But, in some ways, it has led into a quagmire of other problems. Some of the back problems and some of the wrist problems may be eliminated, but a lot of shoulder/neck problems are seen.

If we believe that lots of movement, heavy forces and repetition cause musculoskeletal disorders, we may not be prepared to look at the muscular system during many light tasks. Muscle is quite happy to work in terms of many repetitions; what it doesn't tolerate well is long periods of steady activity without a break. These conditions restrict blood flow and lead to changes within the muscle that can, over a long period, lead to problems in that muscle. Repetition within a muscle

improves blood flow whereas constant activity produces obstruction of blood flow and subsequent injury or damage to the muscle.

This idea of static load or activity without a break or relaxation phase is very important in shoulder/neck problems and muscle problems generally. Loads experienced over long periods of time under certain combinations can cause problems. Typically in shoulder/neck problems we think of the trapezius, which is the muscle that attaches at the base of the skull and onto the neck and supports the shoulder girdle. Just about everything we do with our upper limbs requires the involvement of the shoulder musculature. It is exquisitely sensitive to what we do.

Very small changes in posture, such as elevating the shoulders or moving the arms out, produce quite large changes in muscle activity. The problem is these are quite difficult to see with the naked eye. Take the example of a light assembly task.

It involves lifting parts weighing no more than a few ounces; the workers sit on comfortable chairs which are fully adjustable. If we measure the electrical activity of a muscle, we might see that the activity of the trapezius muscle never drops to zero in all the tasks that are performed. The trapezius muscles never relax. This kind of situation where there is constant static load without any breaks is a classic risk factor for chronic shoulder problems.

I think the problem is not necessarily repetition, force and posture; we should think of monotony--not in a psychological sense, but in a physiological sense of constant loading of the same structures all the time. Certainly muscle is not well equipped to sustain such loading. In fact, a Swedish study states that instead of trying to regulate little things such as repetition and forces, we should be trying to regulate or develop guidelines on limits of monotony--how long we can do exactly the same thing.

Some ergonomics texts seem to perpetuate the myth of perfect posture. They imply that if we could find that perfect work station or that perfect chair that can be adjusted to our particular size, we would be OK. Nothing is further from the truth. Sitting long in any posture will still produce problems. It may produce them at a slower rate, but breaking the monotony is critical.

In other fields we would expect some guidelines in prevention, often from a government. The US Department of Labour has recently put out some ergonomic program management recommendations for general industry. It feels that there is not sufficient information to regulate the causes. It chose to provide recommendations to focus people's efforts in working to combat these problems. What they have said is that they can't tell people exactly what to do because they don't know, but they want people to work towards eliminating some of the hazards by adopting four phases of their program. The four phases identified as critical are worksite analysis (identifying the hazard), prevention and control of the hazards, medical management, and training and education. An honest effort in these areas is probably the best they can mandate.

Many risk identification techniques are available ranging from checklists, implying some knowledge of the problems and using the checklists to jog the memory, to various guidelines on acceptable and unanticipated postures and layout of work spaces. These are very valuable in setting up workplaces and will probably eliminate most problems. But several hard-core problems are not easily amenable to solution. Cashiers again crop up. How do you identify the hazards of a cashier work station? Assuming we have some idea of what causes the problems, we might want to go beyond qualitative answers to quantitative answers.

I would emphasize that not very much is known in a qualitative sense in terms of problems and their solutions. I certainly don't see quantitative guidelines in the near future, but I do see some strong suggestions as to how to manage these problems, because they encompass more than work station design. They include such areas as job design, how we define what a person does, the organization of the whole compensation infrastructure, a whole raft of problems across the whole range of organizational structures. While I have concentrated mainly on medical and work station factors, they are but a small part of a total program for reducing musculoskeletal disorders in the workplace.

QUESTIONS AND DISCUSSION

Yvan Gagnon - DuPont Canada Inc

I have just become involved with ergonomics because my company came to the conclusion that a lot of long-term injuries have been neglected. We have been very successful in managing acute injuries, but that is not enough. We are now trying to raise our employees' awareness of ergonomics and the way they do their jobs. In the area of injury management, we expect employees to report all injuries regardless of how small. We also ask employees to report pain--not to treat it as an injury, but to try to find its cause. If an employee reports a pain in the shoulder which is probably from playing squash the night before, we will look at the way s/he is doing his job. The pain may be from the way the job is done as well as from playing squash. By doing an analysis of the job, we might find there is a task that we can help redesign.

Richard Wells

That approach has received a lot of attention. One of the issues is that with chronic injuries, the longer it takes to get a problem, the longer it takes to fix it. An employee who waits until s/he cannot carry on will have a much harder time in the medical process of healing. It is not enough to recommend that people report; something has to be done when they do report. It can help both in preventing them getting to the worst chronic stages as well as modifying the workplace before people get badly hurt.

It is often suggested that if we tell people about these disorders, we will get a lot of reporting and our injury statistics will go up dramatically. Although the number may increase, the severity should decrease.

Joan Stevenson - Queen's University

I was at a conference where some American consulting companies had actually come up with their own computer packages that would allow input of your worksite analysis and out would come some sort of response. This is outside the NIOSH guidelines. Have you taken a look at any and have you a sense about that type of software development?

Richard Wells

Many consultants are trying to develop ways of quantitatively predicting the injury risk. Certainly a bunch of numbers coming out of a computer is more impressive than someone saying "I think you have a problem." But there is the problem of "garbage in, garbage out." I am not claiming that these programs are garbage, but one would have to question the basis on which numerical values are assigned to some of the risk factors. While they may be useful in identifying

combinations of postures, I think one would have to regard with some suspicion the risk rates that they produce. But they are a way for formalizing the existing knowledge of the main risk factors and they perform a useful service as long as they are not taken as gospel truth. If one doesn't know the importance of shoulder posture and neck posture and the effect of those kinds of issues on carpal tunnel and only looks at movements, the injury risk for that particular disorder may be significantly misrepresented. Cautiously used, they are useful in convincing people that there may be a risk in certain areas of the plant.

Karin Rasmussen - Southern Ontario Newspaper Guild

You mentioned that ergonomic design is only part of the solution. It is true that the capital expenditures to improve safety carry greater weight if a large number of people are involved. Can you give some suggestions or input into how job design with respect to preventing repetitive strain injuries can be improved? Often an argument against having input into the job design with respect to safety is that it may hamper productivity.

Richard Wells

Until recently journalism was not recognized as a high-risk profession for musculoskeletal disorders. Recently there have been a number of cases in the US, in Canada, in Great Britain, and in Europe where journalists on many papers have had high rates of upper limb disorders. This coincided with the introduction of heavy computerization of the office. The whole issue of technological change was handled very badly. New hardware was installed but sufficient thought was not placed on ergonomic concerns such as the proper desks and chairs. Jobs were fundamentally changed; people were spending long periods working with these systems without adequate thought given to how to train them to use them, how to organize their time and how to reallocate tasks between different parts of the newsroom. So the problem was a classic ergonomic one and, of course, fingers were immediately pointed at the height of the keyboard or the position of the chair. Other more intangible features of workplace organization and job design were not looked at. You would have to think of those under the much broader issue of introduction of technology because those were the dominant features of those areas. Those don't imply that the pains and the problems people suffered were any less real than if they were caused by poor ergonomic design of the furniture. It was just that these other features seemed to have less well-realized and less thought-out interactions with the human system than the purely ergonomic height and chair issues that usually come to the forefront.

Coral Addison - Norfolk General Hospital

I am new in my position as WCB Manager at the hospital; I have found that there is a lot of carpal tunnel syndrome in the laundry department and in the dietary department. It seems to be a primarily female, primarily over the age of about 45 workforce. How much of a role do genetics and other contributing factors play in this?

Richard Wells

Excellent question. In terms of risk factors, both of those areas are classically high risk irrespective of the employees in them. However, there is often an historic tendency for females to work in those areas. So without knowing more detail, one couldn't claim the relative contribution of either non-occupational or occupational factors. You did mention that there are some age and gender biases within your workforce and it does seem that carpal tunnel has a peak in the 45-50

year range. Certainly that may have an effect. The background rate of carpal tunnel is not very well known for different populations. In a recent study in British Columbia in the age group you are discussing, they found in a control group somewhere between 8% and 12% of the people had symptoms of carpal tunnel based upon their electro-diagnostic findings. They were not experiencing the symptoms, but there seemed to be evidence of an underlying condition that could be very easily aggravated by any work. There are probably combinations of all these features and which people are trying to tease apart. To that extent, I can't comment on your particular case, but those are some of the factors that complicate carpal tunnel and it is that mixture of the work environment and particular characteristics of the population and how those interact that seem important.

William Urie - Hamilton Board of Education

One of my concerns is with our custodial group where we seem to have an increase in repetitive strain injuries. Of particular concern to me is the individual's present health condition. You said that other personal factors may contribute to carpal tunnel syndrome. How is a minor type of repetitive task impacted by the individual's own physical condition? What strategies can be implemented to try to address that?

Richard Wells

One has to recognize that people within the population have different physical makeup. How one chooses to deal with that is philosophical more than anything else. An ideal approach would be to devise jobs or change them wherever possible so they can be done by the widest possible range of people irrespective of their physical makeup. If you go beyond that, you then have to start looking at job selection, pre-placement screening, and all the other very difficult issues that end up becoming big problems. The philosophy that I have followed is to try to change the job as much as possible--not only the physical factors, but all the factors of the job--so it is available to as wide a population as possible. That would also be within the spirit of current legislation.

COMPENSATION ASPECTS OF RSI

Lillian Vine

Geoff Wright received his academic training at the University of Toronto where he obtained a Bachelor of Science degree in Industrial Engineering, a Master of Science degree in Human Factors Engineering, and a PhD in Ergonomics. After graduating with his PhD from the University of Toronto's Faculty of Medicine, he joined the Defence and Civil Institute of Environmental Medicine as a research scientist.

He then joined the Ontario Ministry of Labour and, as Chief of Safety Studies Service, developed the Ministry's capabilities in ergonomics. He was later appointed Director, Special Studies and Services Branch, within the Ministry of Labour's Occupational Health and Safety Division.

He is now with the Workers' Compensation Board of Ontario where he has held executive positions in the Occupational Disease Department and Specialized Vocational Rehabilitation Services Department before assuming his present position as Senior Ergonomics Consultant.

Geoff Wright

I want to provide the perspective that an ergonomist working for the Workers' Compensation Board has on the issue of repetitive strain injuries. I will try to cover briefly the areas of jurisdictional review, Ontario's policies, Ontario statistics, the Board's Complex Case Unit study, and return to work.

Jurisdictional Review

Even though I am representing the Ontario WCB, I want to mention repetitive strain injuries from the perspective of other compensation boards as well. Rather than itemizing how each province adjudicates repetitive strain injuries, I would like to draw your attention to the Canadian Centre for Occupational Health and Safety's review on the adjudication of repetitive strain injuries within the various jurisdictions. (Appendix A) There is no way of concisely summarizing the findings because each province has its own act and regulations and has its own way of dealing with the issue.

Ontario's Policies

Under the Ontario Workers' Compensation Act two categories of repetitive strain disorders are part of Schedule 3--tenosynovitis and bursitis. The remaining repetitive strain injuries are dealt with under the Ontario policy on disablement. In the disablement aspect of adjudication, one has to show the work-relatedness of the particular condition; consequently the Board's adjudicators would be looking for a causal relationship with work. In doing that they would look at a number of factors. The more obvious risk factors are strenuous work, an awkward position, unaccustomed strain, or a movement arising out of and in the course of employment. The Ontario Workers' Compensation Board does have a policy manual which is available in libraries. The manual outlines the types of procedures and policies that the Board uses in deciding whether or not a repetitive strain injury is to be compensated.

Ontario Statistics

Today, I want to provide a general perspective to this whole question of repetitive strain injuries, so I will be focusing on the Ontario statistics, which come from the Form 7's. The statistics are generated on the Board's System 57. This part of the presentation is very similar to what you would be able to do in your workplaces. If your plant is large enough, you would be able to look at your compensation claims and do a similar analysis. The one advantage of looking at it from an Ontario perspective is that there are a fair number of claims so you can start seeing some emerging patterns. Certainly within your own workplaces, if you were doing an analysis of your compensation claims, it would help you identify those areas where more resources should be committed to solving this problem. By presenting the Ontario overview, I am trying to show where, in setting policies or guidelines, one would concentrate resources.

The second part of the presentation will deal with a small sample of claims that have come into the Board's Complex Case Unit (Injuries).

In System 57 lost time claims are classified as "Injuries" or "Diseases." For the "Diseases" classification, musculoskeletal injuries are reported under inflammation or irritation of joints, tendons, muscles, nerves and arteries.

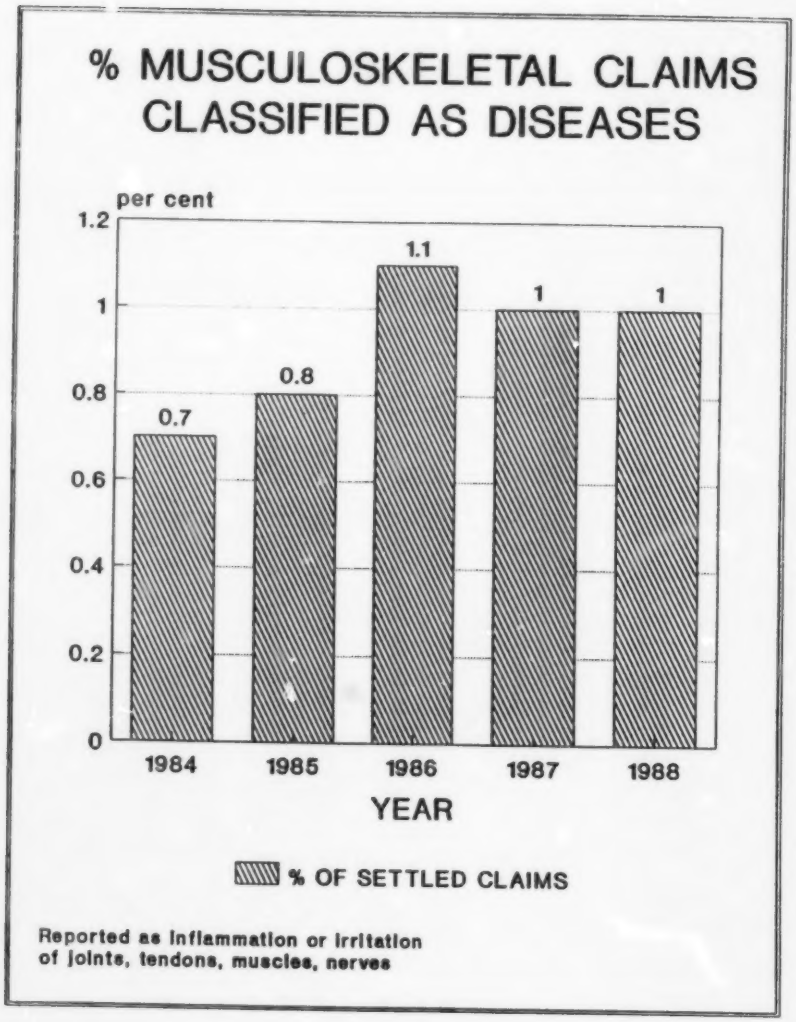

Figure 1

a) Diseases

Figure 1 shows the temporary total compensation claims for the diseases classification for the years 1984-1988. I stopped at 1988 because that is the year that I will outline in greater detail during my presentation. One can see that musculoskeletal claims classified as diseases account for approximately 1% of all settled compensation claims.

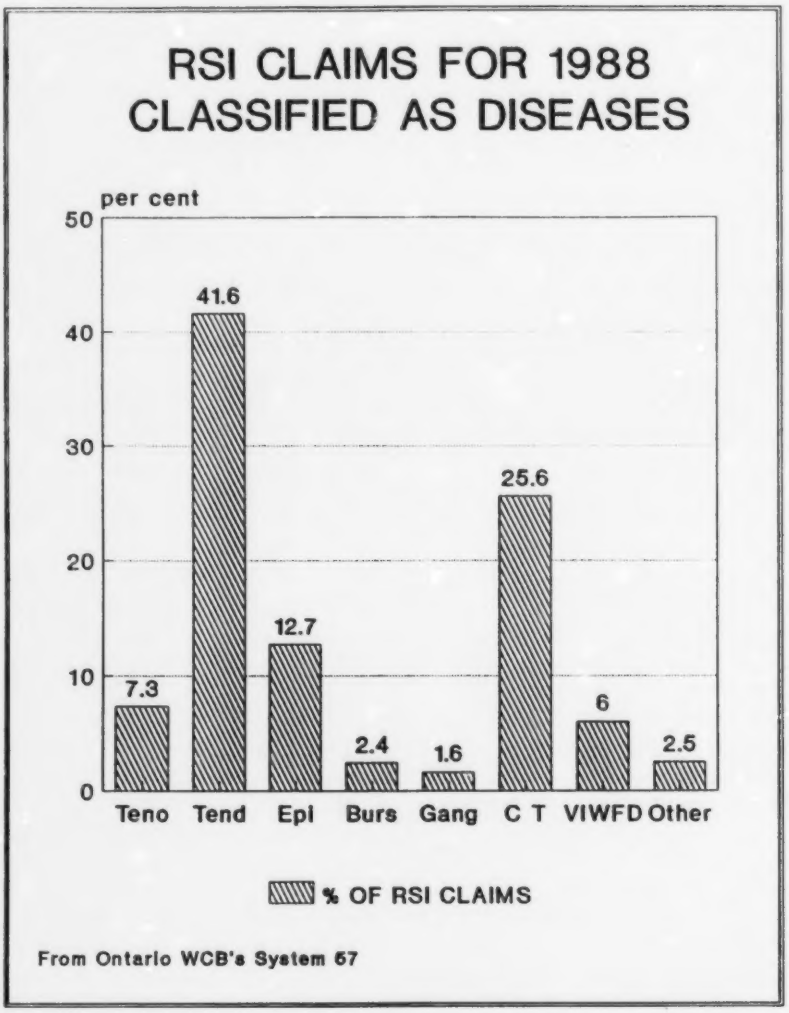

Figure 2

Figure 2 provides the percentage breakdown of the repetitive strain injuries in the diseases classification for 1988. The diagnostic categories reported for these repetitive strain injuries are: tenosynovitis, tendinitis, epicondylitis, bursitis, ganglion, carpal tunnel (which represents about 26% of all the repetitive strain injuries claims), and vibration-induced white finger disease (VIWFD). There is also an "other" category which deals with multiple sites and is hard to characterize as one particular type of repetitive strain injury.

b) Injuries

For the "Injuries" classification musculoskeletal strain injuries are reported in the category "Sprains and Strains." "Sprains and Strains" also includes back injuries, which make up a very significant portion of all WCB claims. In 1988, sprains and strains represented 50% of all the settled compensation claims (Figure 3).

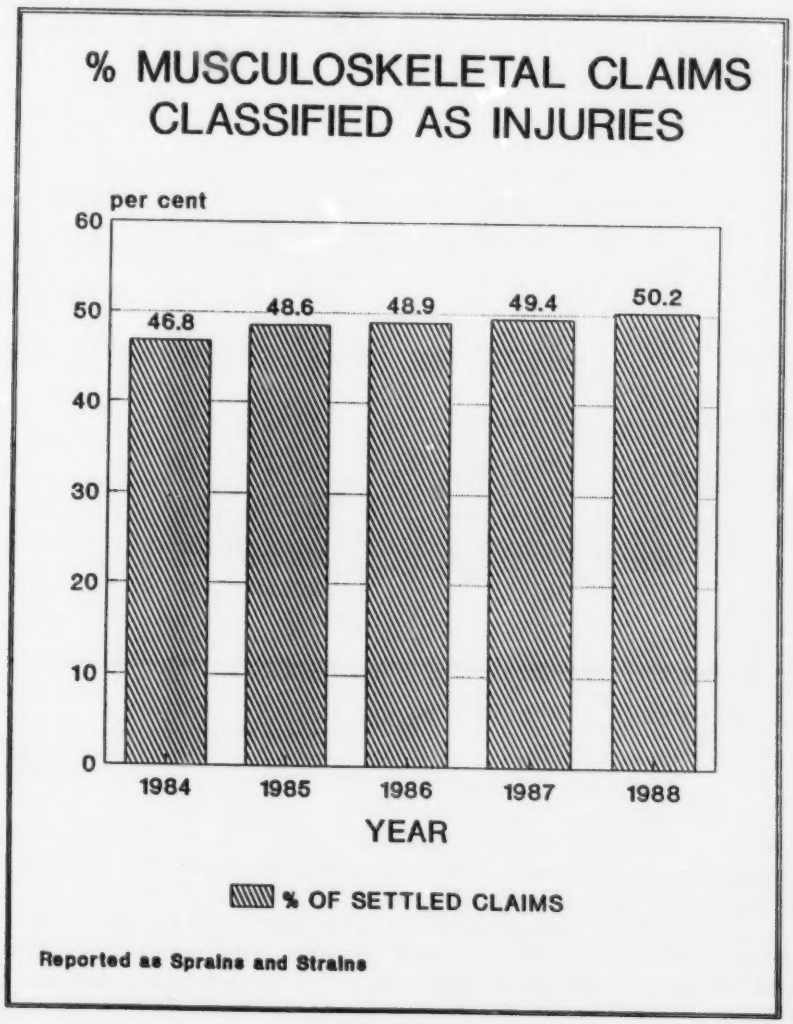

Figure 3

c) Combining Injuries and Diseases

Under System 57, the number of WCB lost-time claims for "Diseases" was 7,271; of these, 2,207 were RSI claims (Table 1). The "Injuries" classification has many more lost-time claims. However, within the "Strains and Sprains" category there are specific ICD codes that are the same diagnostic categories as reported in the "Diseases" category for repetitive strain injuries. In an analysis done by the Ministry of Labour, this approach was proposed as a way to get a better perspective on the number of cumulative trauma disorders occurring in the province of Ontario. Using this type of analysis, we can see that of the total of 208,441 WCB lost-time claims in 1988 almost 5,931 were related to repetitive strain injuries.

WCB CLAIMS - 1988

	RSI CLAIMS	WCB LOST-TIME CLAIMS	% OF CLAIMS
DISEASES	2,207	7,271	30.3
INJURIES	3,724	201,170	1.9
TOTAL	5,931	208,441	2.8

Table 1

Table 1 also shows the number of RSI claims as a percentage of the lost-time claims. The RSI claims represent 30.3% of the "Diseases" lost-time claims. However, for "Injuries" the RSI claims only represent 1.9%. Taking those respective totals of 2,207 and 3,724 gives a total of 5,931 repetitive strain injuries claims. As a percentage of the total lost-time claims seen by the Board in 1988, the number of RSI claims is 2.8%. That is certainly not a small number when you consider the total number of claims. The rest of the graphs in my presentation look at the combined total--the 2.8%.

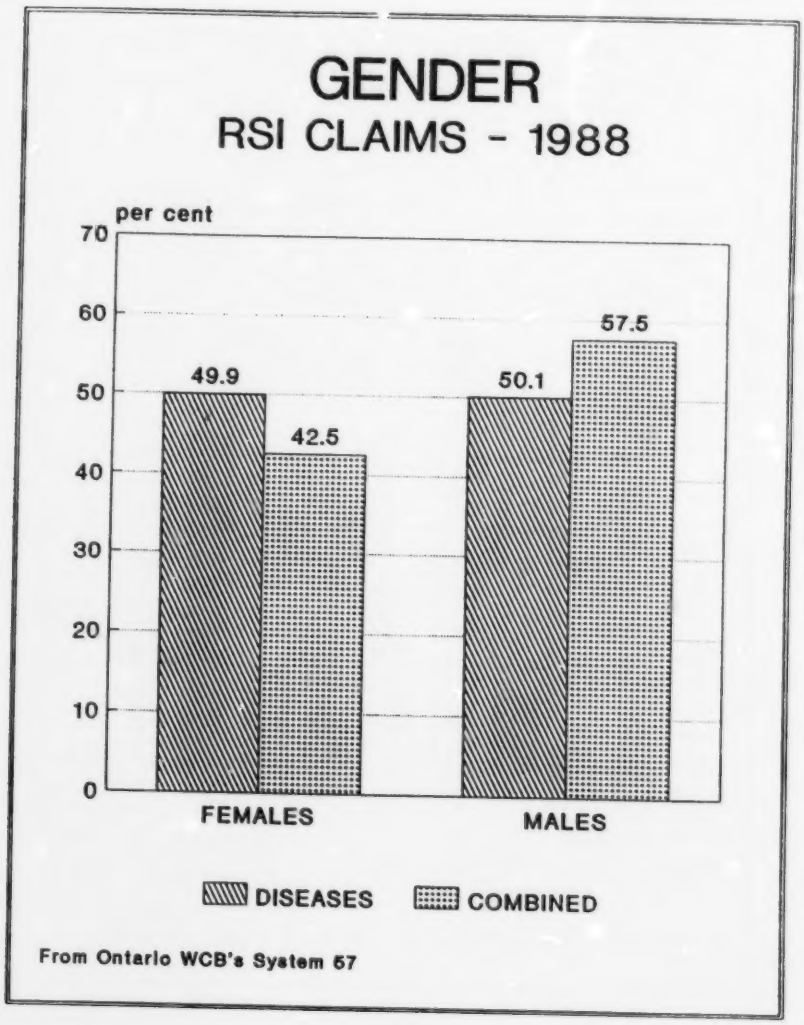

Figure 4

For instance, looking at the ratio for RSI claims in the "Diseases" classification between females and males, you can see it was a 49.9% to 50.1% split. But when you look at that combined total (i.e. RSI claims for Diseases and Injuries), the females actually comprise 42.5% and the males 57.5% of the claims. Keep in mind that we don't have denominator data and one must take into account the fact that there are many more males working in those jobs than females. There is no simple answer, but I did want to try to portray the fact that you have to be very careful in trying to answer whether there is more of a predisposition for females or males towards particular conditions.

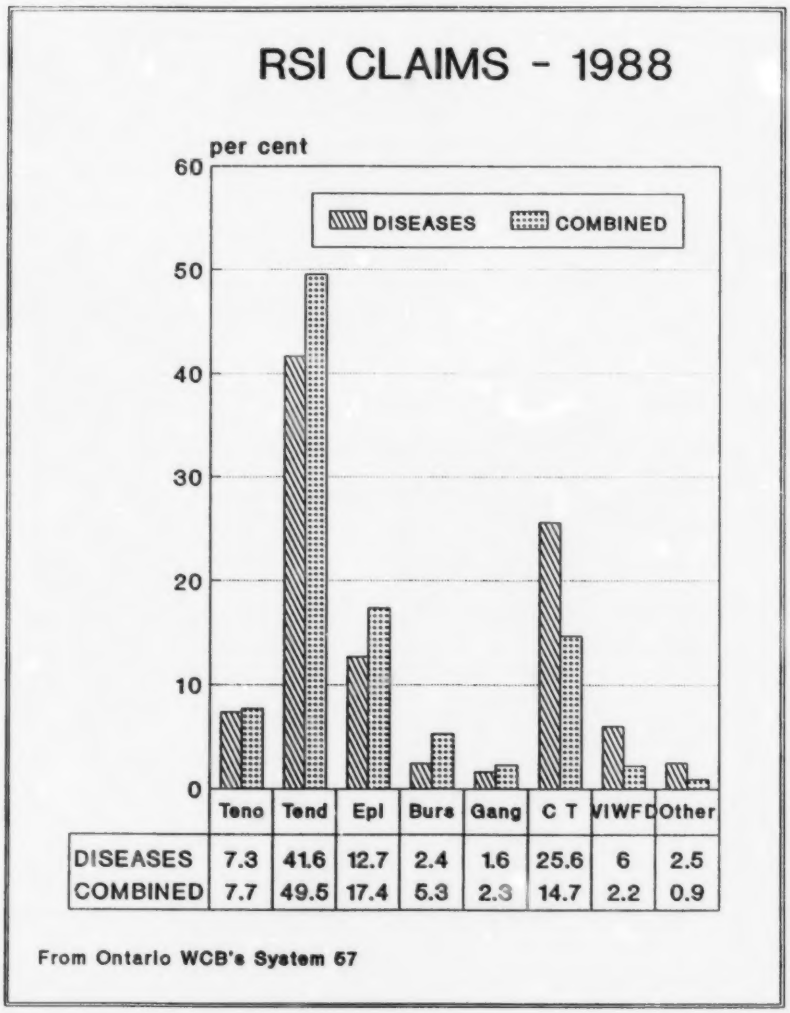

Figure 5

If we are looking at the effect of the "Diseases" analysis versus the "Combined" analysis, tendinitis represents a higher percentage of all the repetitive strain injuries claims, increasing from 42% to 50% of all RSI claims (Figure 5). It is also interesting to note that the percentage of carpal tunnel claims decreases from 25.6% to 14.7% of all the repetitive strain injury claims.

The RSI claims for Diseases and Injuries in 1988 were combined and analysed by rate group to assist in identifying the industries where there is a higher predominance of repetitive strain injuries (Figure 6).

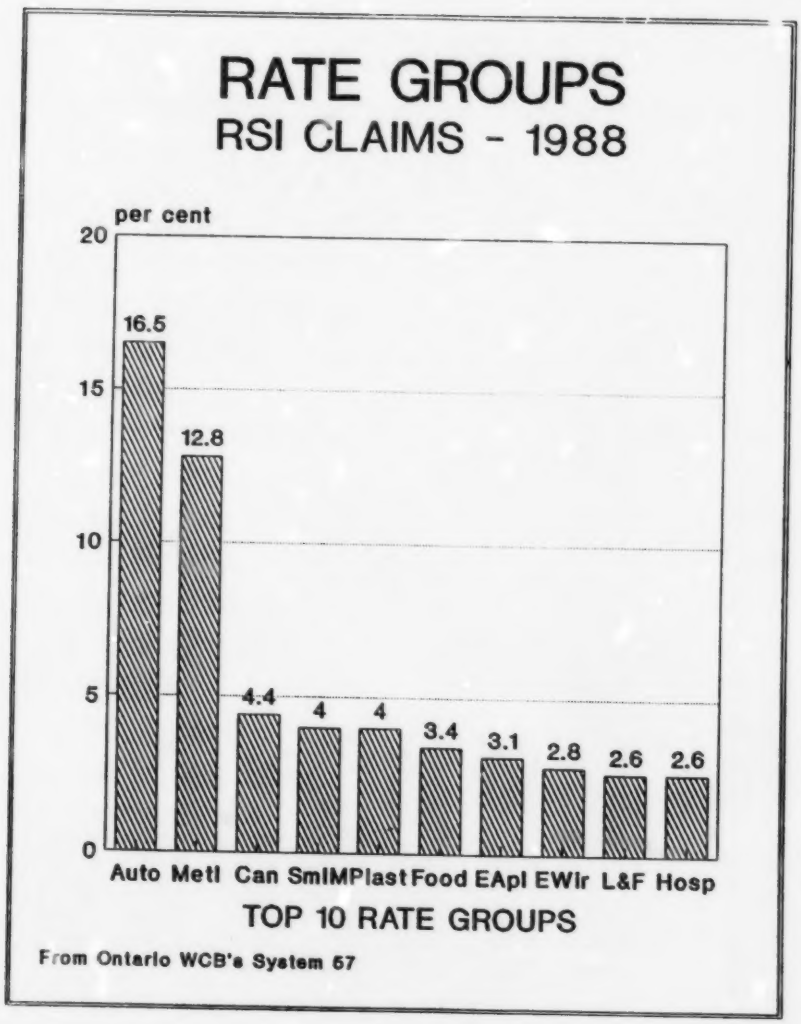

Figure 6

The "top ten" rate groups identified are the automotive sector, working with metals, canning, small manufacturing, plastics, food, electrical appliances, electrical wiring, leather and fabrics, and hospitals. However, these groups represent only 56.1% of all the repetitive strain injuries claims in 1988 so there are a lot of industries other than these where repetitive strain injuries are occurring. Collectively, repetitive strain injuries are significant and every effort should be taken to reduce them.

In assessing what is happening in the workplace, it is useful to think in terms of job groups rather than rate groups. Again the RSI claims for Diseases and Injuries in 1988 were combined in the analysis.

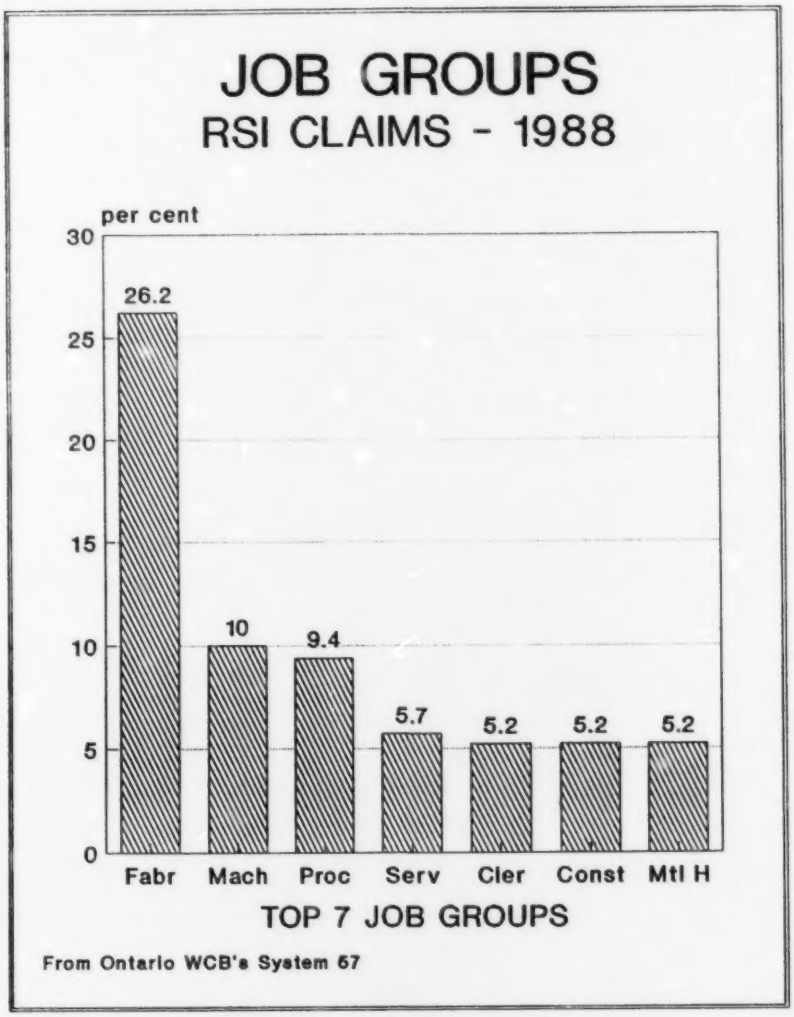

Figure 7

Seven job groups were found to have more than 5% of the RSI claims settled in 1988 (Figure 7). The job groups identified are: fabrication, machines, processing, service industry, clerical, construction, and material handling. Cumulatively, these seven job groups represent 72.2% of the RSI claims settled in 1988.

S I C COMBINED
RSI CLAIMS - 1988

Std. Industrial Classification	Per Cent
Motor Veh Inds	12.8
Motor Veh Parts	7.8
Meat & Poultry	4.2
Site Work	3.6
Plastic Fabricat	3.1
Plastic Film	2.7
Utility Industry	2.0
Metal Products	1.9
Busi. Machines	1.8
General Stores	1.7
Hospitals	1.7
Restaurants	1.6
Metal Mines Misc.	1.6
Construction	1.5

From Ontario WCB's System 57

Figure 8

Another way of assessing what is happening in the workplace is to look at the RSI claims by Standard Industrial Classification (SIC). One can see that in comparison to other industries the motor vehicle industry has a high percentage of repetitive strain injuries; the sub-assembly of motor vehicle parts is next highest (Figure 8).

I don't think there are any surprises in this type of data. The scientific literature clearly identifies these as industries where repetitive strain injuries occur.

d) Study Results

I mentioned that we had done a study within the Workers' Compensation Board. It is a limited study with a total of 169 claims that came into the Board's Complex Case Unit (Injuries) from the Central Client Services Integrated Service Units during a three-month period from September to

the end of December. We were able to get more specific information than is available on the Board's Form 7. Although it is a very small sample, the claims are consistent with the experience for repetitive strain injuries that occurred in the province of Ontario in 1988.

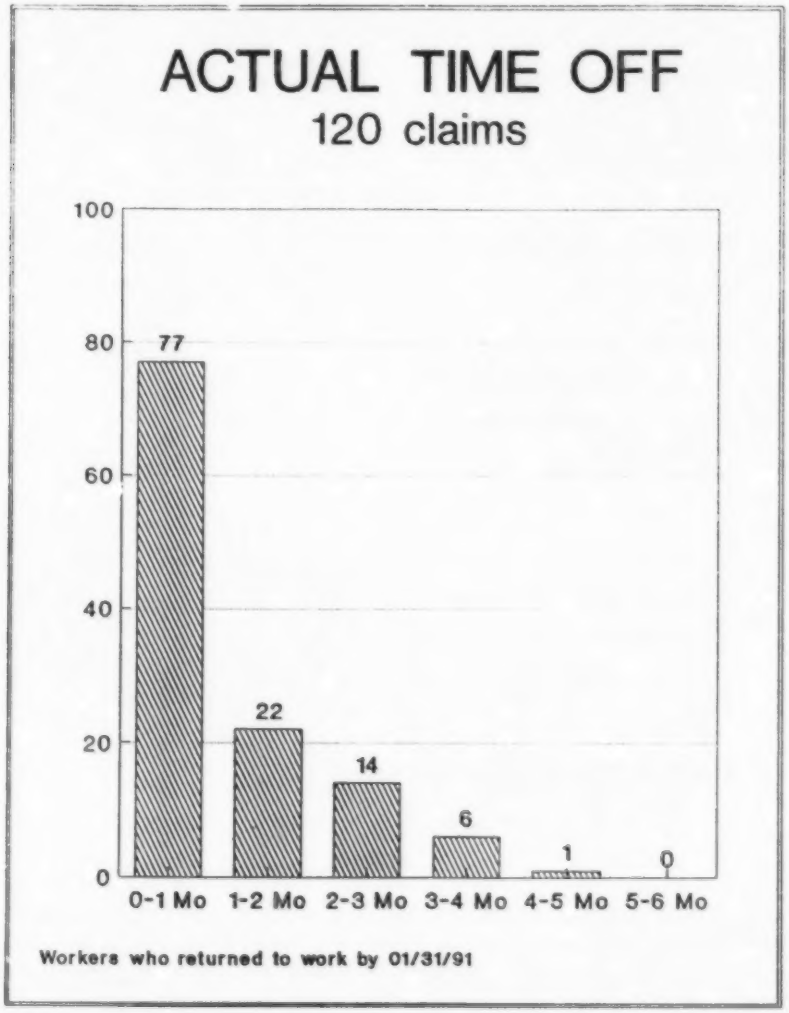

Figure 9

One of the aspects looked at was how long workers were off from work for their injury. However, we had a cut-off date of January 31, 1991. As a result, because the study only went for a short period of time and we don't go beyond the 5-6 month period, the true curve of time off from work would extend beyond 5 months (Figure 9). The data that is missing is for those workers who are off longer because they hadn't yet returned to work. As a result, when you look at actual time off for most injuries, there is an exponential decay and it goes on past the 6-month mark--absences can last a year, two years, sometimes much longer.

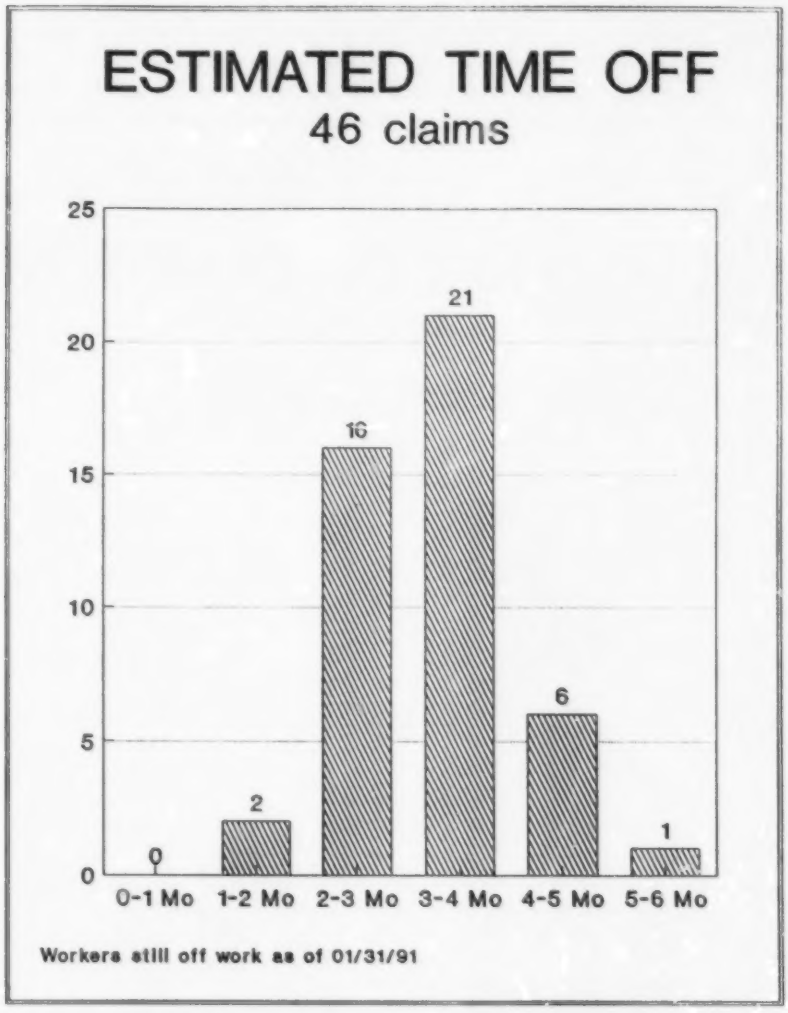

Figure 10

One finding in the study of 169 claims was that there were 46 workers who had not yet returned to a job after injury. Figure 10 shows that the workers who had not yet returned had all been off for longer than a month. Also the number of workers who were off for 2 months or 3 to 4 months, etc., will change because some of the workers still off after 3 months in the study will perhaps be off for upwards of 1 year. Consequently, the "height" of the curve will start being reduced because we will be able to fill in the values for the point when they do return to work. In spite of these limitations, the data does support the view being expressed in the scientific literature that there are those who are affected in different ways.

I am hoping to be able to do a more detailed analysis on those workers who had returned to work versus those who are still off to see what some of the differences are between those two groups.

Components of the analysis would include detailed information on medical diagnoses and the medical treatments that they have gone through. Data is also available on the type of jobs they have been returning to or could have returned to following injury. It is hoped that such an analysis will provide insight into rehabilitation, the early return to work, and recovery from repetitive strain injuries.

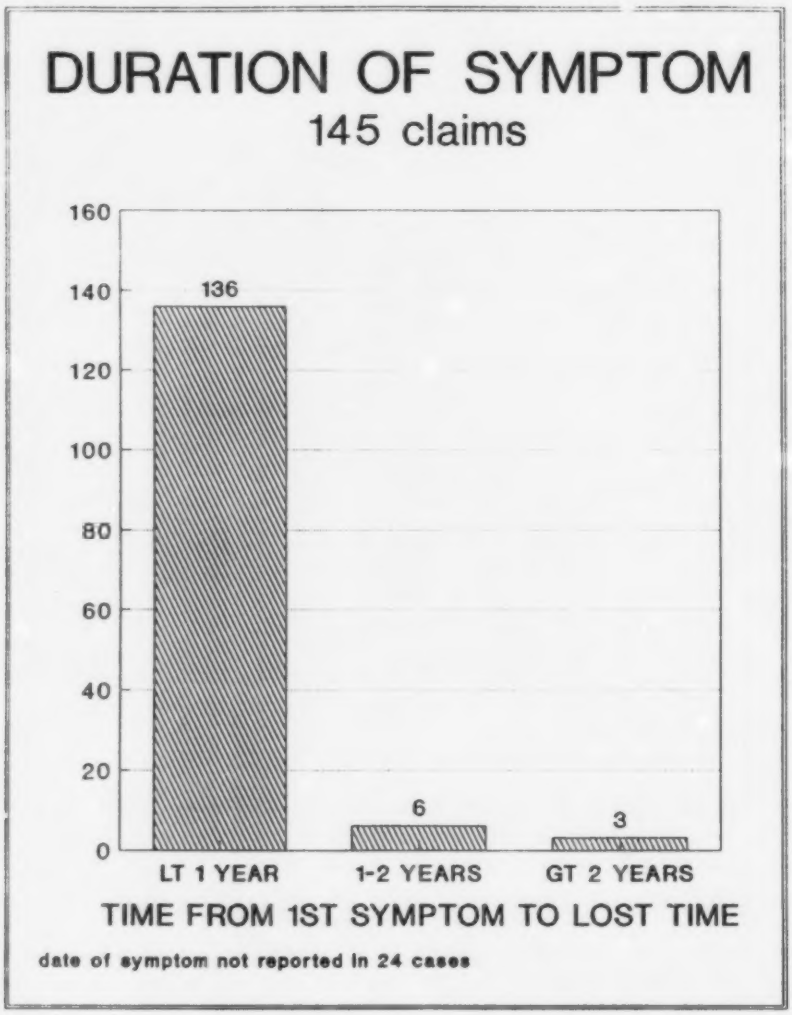

Figure 11

Another analysis that was looked at was the length of time from the first reporting of symptoms until the commencement of time off for that repetitive strain injury. I have a series of three curves. The symptom was not reported in 24 cases, so that left 145 claims where the duration from the time of first symptom to the actual date of lost time was known. Figure 11 shows that in 136 cases the time from the reporting of the symptom to the commencement of lost time was less

than one year. For the remaining 9 claims, the length of time from first symptom to actual lost time was quite long (i.e. in 3 claims the duration was greater than 2 years).

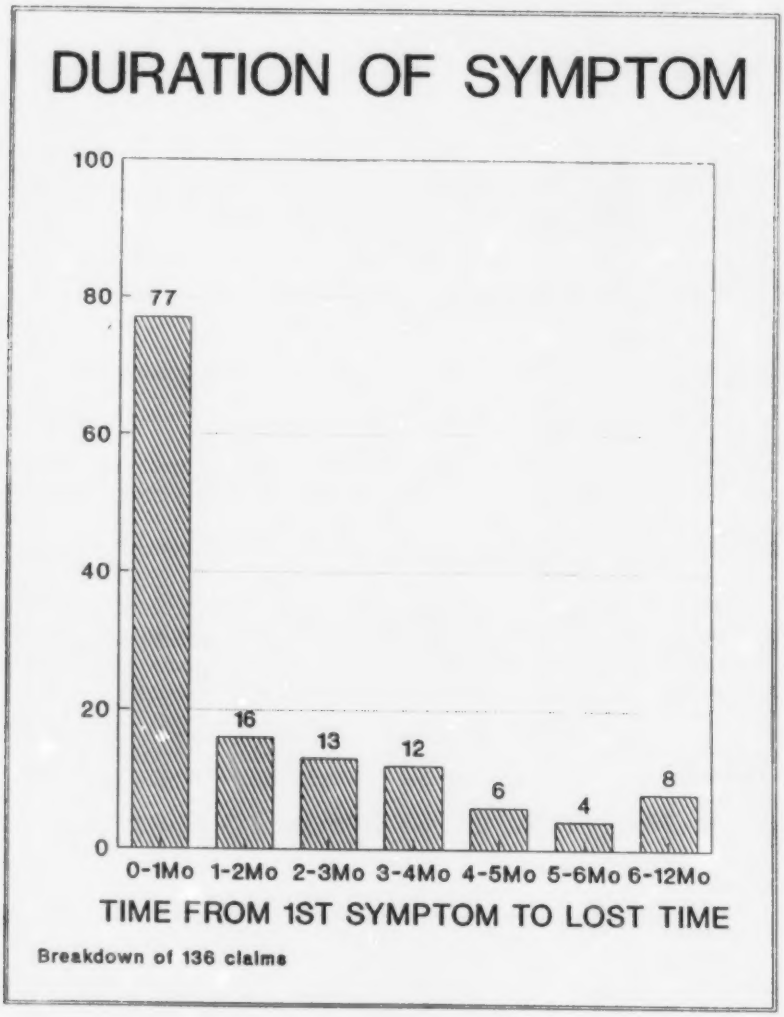

Figure 12

Figure 12 shows a breakdown by month for those 136 claims where the time from first symptom to lost time was less than a year. But note that the data for the period 6-12 months has been grouped together. There is a high number of workers (77 out of 136) who had reported their first symptom and had lost time within one month.

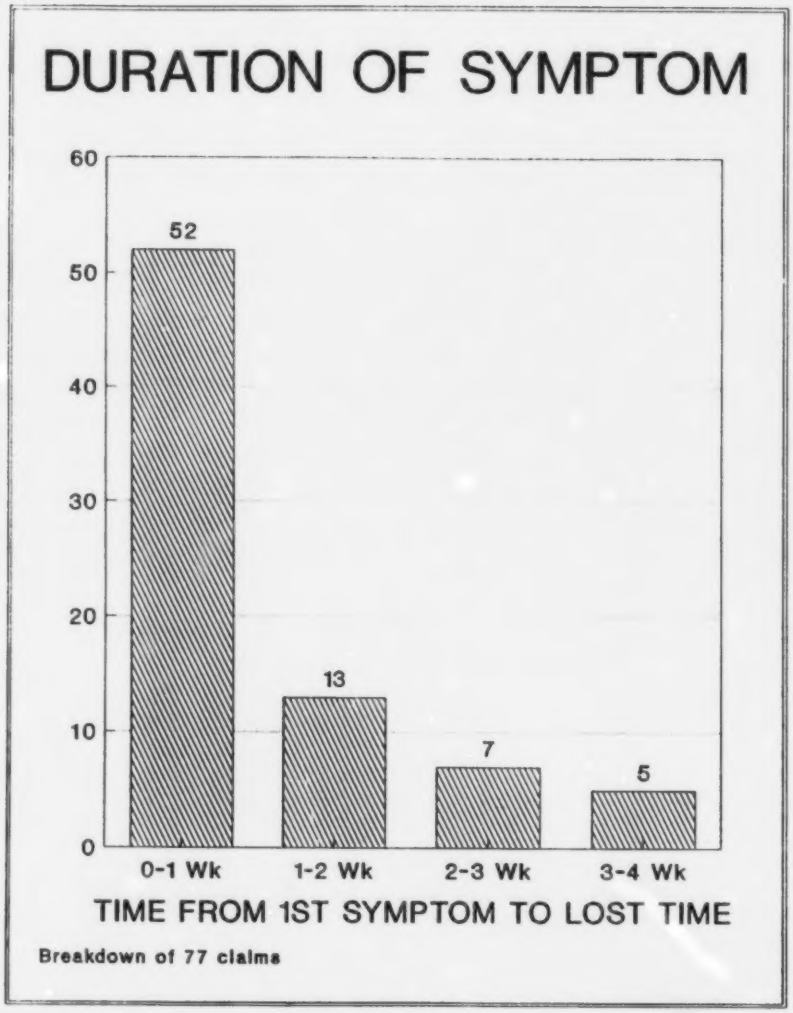

Figure 13

Figure 13 shows the duration by week of those 77 claimants who had reported a symptom and lost time. A very high number (52 of the 77) were off within a week of reporting a symptom. This finding has clear implications for the successful prevention of many repetitive strain injuries. If you do not investigate the reporting of a repetitive strain injury right away, you are probably going to be faced with a lost-time injury. Clearly, it is better to assess and correct the situation prior to, rather than after, the development of a repetitive strain injury.

Another component looked at within the 169 claims was some of the risk factors that have been reported in the scientific literature; force was one of the first (Table 2).

RSI STUDY
169 Claims

Force	# of Claims	%
High	47	27.8
Medium	86	50.9
Low	36	21.3
	169	100.0

Table 2a

One often hears that high force is a factor in cumulative trauma disorders. However, in our sample, 50.9% of those claims reported medium force.

Repetition rate was also looked at; 80% of those claims reported a high repetition rate.

Another factor looked at was duration of exertion. Medium to high force combined with a high repetition rate combined with doing the job all day are the types of claims that were being submitted. In that sense it is somewhat reassuring to know that the risk factors being reported in the literature are clearly very reflective of the type of claims that are coming into the Board.

RSI STUDY
169 Claims

REP RATE	# of Claims	%
High	135	80.0
Medium	29	17.2
Low	5	3.0
	169	100.0

Table 2b

RSI STUDY
169 Claims

Duration	# of Claims	%
100%	142	84.0
50%	9	5.3
Other	18	10.7
	169	100.0

Table 2c

e) Return to Work

One of the questions that this study could provide assistance on is the question of what happens to the worker after a repetitive strain injury. Where are we sending them back? As I mentioned, in our sample of 169 claims we do have information of what jobs they have gone back to. If we are able to continue following those people in this sample, it will be interesting to see whether or not they have recurrent injuries. In fact, of those 120 that have gone back to work we have already had three recurrences of the repetitive strain injury. I am hoping that this sample will provide us with some further insights into the whole question of workplace modifications and the types of issues that should be addressed when placing the worker in vocational rehabilitation following a repetitive strain injury.

QUESTIONS AND DISCUSSION

Joan Stevenson - Queen's University

I would like to congratulate you on the sub-study of the 169 cases, but it strikes me that the epidemiological approach has not really done what Richard Wells wants yet. He is asking for a better handle on how much is too much; what number of repetitions are these people doing, what kind of forces are they applying? Not just in high, medium and low forces, but in distinct numeric values. And who else in the company is doing a like job? Have you any thoughts of expanding this study to try to get at the parameters that we need from an epidemiological approach?

Geoff Wright

Certainly a lot more can be done in the way of analysis than just showing it graphically. I don't see much of an expansion above those 169 claims, but we will be able to do a lot more detailed follow-up. I agree that the force categories used are fairly rough. But if we find that there is a distinct difference between those who have returned to work and those who haven't, we then would probably be willing to spend the time to send in a worksite analyst to look more closely at

those jobs. I don't think we would be prepared to do it just on the hope that there would be something there, because that would be a fair commitment of resources which should be used for getting injured workers back to the job. But I think there are immense possibilities for more detailed follow-up and that is certainly being planned. What I have presented here is just scratching the surface.

Those 169 claims are only hand/wrist claims. We thought, because we were just trying this to get a feel for it, we would keep it simple by looking at hand/wrist claims. If the study were to be expanded, it would look at upper extremity injuries.

Angela Stelmakowich - Canadian Occupational Health and Safety News

As I understand it, the WCB only compensates right now for bursitis and tendinitis. Is that correct?

Geoff Wright

No, that is not correct. Bursitis and tenosynovitis are the two repetitive strain injuries that are listed in Schedule 3. The other repetitive strain injuries are adjudicated using the Board's criteria for disablement--that is, the injury must have some causal relationship with the work being performed. That was another benefit for doing the study--the Board is able to take a look at some of its internal procedures. At the first CCOHS workshop on Repetitive Strain Injuries, a number of issues were identified. Those issues were evaluated as part of the Board's review of repetitive strain injuries. This small sample of 169 claims is part of the Board's process of reviewing the policies about repetitive strain injuries.

Angela Stelmakowich

What is compensated outside Schedule 3?

Geoff Wright

We are seeing all of them--carpal tunnel is not in Schedule 3 but it is compensated. Others are tendinitis and epicondylitis. Any would be compensated if they can be shown as being work-related.

Angela Stelmakowich

Do you have any numbers relating to the costs of compensating a repetitive strain injuries claim?

Geoff Wright

I don't have any costs. They can be calculated based on the duration of absence from work, but I haven't done that. A draft report about the costs of repetitive strain injuries is being done by the Ministry of Labour.

Angela Stelmakowich

Is there any indication that the costs are rising at all? Is there any trend that you know about if you don't have specific numbers?

Geoff Wright

That was one of the reasons I showed some of the trend data. You often hear that repetitive strain injuries are increasing. I think we are finding more specific diagnosis as people become more aware of the diagnostic categories that previously we coded as sprain and strain injuries. You then start seeing more repetitive strain injuries being reported. It doesn't mean they weren't there before; it just means a change in how they are being classified. It is very difficult to say what is happening exactly in regard to repetitive strain injuries in Ontario. But there is definitely an acute awareness of them in industry.

Yvan Gagnon - DuPont Canada Inc

Those 169 claims that you have been analysing, I understand a lot of them are back to work. Has there been anything done by the WCB to help management or employees to recognize the source of the injury so that they could try to prevent recurrence?

Geoff Wright

The part of the WCB that is involved with prevention is the Safety Associations. They, of course, are affected by Bill 208 which creates the Ontario Workplace Health and Safety Agency which will have continued emphasis on prevention. Where the Board is concerned in a preventive sense is in returning an injured worker to a job; the aspects of that job that you would be concerned about for returning an injured worker to it are identical to the factors that one should be concerned with in preventing those injuries in the first instance. The two go hand in hand. The emphasis within the WCB is getting an injured worker back to work, so we assist management in returning injured workers. In turn, we are finding that this has increased management's awareness of prevention. We often find that when our worksite analyst goes out with an injured worker to see about his/her safe return to work, all of a sudden the company managers realize that those same principles apply to other parts of their operation. In the plant they then institute the same changes that are being instituted for the injured worker's return.

Yvan Gagnon

So you are relying on the Safety associations to provide education and analysis of jobs so that people don't have a recurrence--specifically these 169 claims you used in the study?

Geoff Wright

We work together. The mandate of the newly created Agency is towards the education component. One has to work within one's mandate but we certainly work with the safety associations and clearly if we had some information from this analysis that would assist in an education or prevention aspect, we would certainly make sure that information was shared. That is one of the reasons for being here today--the sharing of information.

Bill Petrie - Southern Ontario Newspaper Guild

I am a bit surprised that you were surprised that the clerical worker group found its way into the top seven job groups that are affected by repetitive strain injuries. I would like to get your reaction to the suggestion that this is only the tip of the iceberg, that a lot more claims probably would be before the Board if people were more aware of the problems that clerical workers have,

particularly those who are working on VDTs. Also, clerical workers are often in industries that are covered by collective agreements that provide sick leave provisions and many of these injuries are not getting reported simply because people are taking time off work by using sick leave father than going to WCB.

Geoff Wright

I wasn't surprised that the clerical group was there; my concern the first time through was that when I did the analysis looking at rate groups I was surprised that there wasn't a group that I could identify as being clerical. So when I did it by job, I wasn't surprised it was there, I was in fact relieved it was there, because I knew that repetitive strain injuries were occurring and hadn't shown up. Clearly they are occurring in that group.

As for the aspect of under-reporting because people are taking sick leave, I am unable to comment on that but I think sick leave only works for a certain time and I think we both share the view that whether they are taking sick leave or time off on compensation, one of the real issues is what jobs they are returning to and what risks are associated with that return. I did mention the recurrence we were seeing out of those 169 claims and that was within three months; I was hoping there would be further discussion on that issue.

Moe Kuzyk - Canadian Automobile Workers' Union

I want to mention that labour has a difficult time with statistics, because the statistics that are usually presented can be interpreted in several different ways. When CCOHS holds another repetitive strain injuries conference in 1993 or 1994 and we take a look at the statistics presented by the WCB, will there be anything to reflect the decrease in repetitive strain injuries in the automotive sector, to reflect the economic downturn in the automotive sector, or is it going to look as if the automotive companies have done an exceptional job in decreasing their repetitive strain injuries?

Geoff Wright

You will recall in my presentation I did make the comment that we don't have denominator data and that is what you are asking about. You have to know how many people are performing jobs where they would be at risk of repetitive strain injury and then look at what you are getting to be able to make meaningful comparisons, particularly when you are looking at the "pre" versus "post" situations. If you want to know whether your preventive aspects are working or not, you want to make sure that factor is accounted for.

Al Hodder - United Steelworkers of America, Local 1005

You indicated on the graph that 77% of the people had gone back to work within one month, suggesting that the situation was acute. Is there a plan to follow up by further study based on what type of work they go back to--whether it was pre-accident employment or regular duties? That would change the statistical data that would show up at the end based on recurrences.

Geoff Wright

We do have the type of information you are asking about; we have it on our files whether they have gone back to the pre-accident job or another job. We are hoping that the numbers will allow

us to do an analysis of that variable. It is very important when you think of rehabilitation and what we can do to make sure that workers are not getting re-injured.

Phillip Faulkner - CCL Custom Manufacturing

Does the WCB have a certain time frame at which point it allows a claim to be established for people who develop symptoms or actually have a severe case of repetitive strain injury? What reasonable time period can we expect for an acute case to be off or a person with a chronic case?

If the worker has an actual case of repetitive strain injury, what defence do we have if we have tried as best we can to ergonomically design the station, to have relief from that claim?

Geoff Wright

To answer your second question, the recent amendments to the WCB Act provide reinstatement provisions which put onus on the employers for workplace accommodation in regard to the return of an injured worker.

Phillip Faulkner

There are pre-existing conditions in a number of situations. For example, someone is overweight, drinks, smokes heavily and never exercises and has a heart attack on the job, is the employer legally responsible for that? Does the WCB factor in or recognize any pre-existing conditions that could contribute to or have an effect on a repetitive strain injuries to make it worse that it would be from working conditions?

Geoff Wright

The Board doesn't proportion the claim; it is an "all or none" situation.
With regard to your first question about the time frame for acute symptoms, we are hoping to look at repetitive strain injuries in regard to the Board's initiative of community clinics and regional evaluation centres. The data that we have collected may help provide some further clarification of some issues of treatment of repetitive strain injuries in the acute sense. Most of you are aware that the Board's medical rehabilitation strategy has a three-tiered approach. The first is community clinics. The idea is to use the sports medicine model of rehabilitation--early active intensive treatment--as the first tier. Injured workers are able to go to community clinics for sprain/strain type injuries. How repetitive strain injuries get handled within community clinics is something that is certainly being looked at to make sure that policies are consistent.

Eleanor McRae - L A Liversidge and Associates Ltd

Regarding your study on the 169 cases, which group within the Board is responsible for studying these cases? How long is it your intention to carry on the study? What type of specific information will you be gathering in relation to these cases? What is it you hope to achieve?

Geoff Wright

It is a multidisciplinary group that is looking at it from the Complex Case Unit (Diseases), from the Policy group, and from the ergonomic perspective. Others assisted as well.

Because we were only looking at hand and wrist injuries, we are not likely to be collecting more on hand/wrist. That part of the data collection has stopped. Because these are active claims, we are able to follow up. In some of the duration curves you can see the arbitrary cut-off just because the study had ended; in three months' time for instance, we can go back and see how many of those 46 claims are still off. So that with time we will be able to follow up and see just how those curves look with a longer period since injury.

Eleanor McRae

So you are looking more or less for recurrence-type information--what type of work they return to?

Geoff Wright

Yes.

Eleanor McRae

What about treatment as far as how many had surgery versus non-operative treatment?

Geoff Wright

We have that data too; it would be interesting when you look at the group that has returned versus those that have not. I hope to do some subsequent analysis to see whether it is related to medical treatment, severity of injury, and many other factors. This was just a preliminary graphical analysis and we hope that we can pull out of the data some of those specifics that you mentioned.

Eleanor McRae

Will it be continued to the point where their claims have come to a conclusion to include a pension assessment or will you only be studying them for a specific time.

Geoff Wright

The length of time we might be able to study them is unknown at this time. It depends how rapidly those 46 claims return to work.

Lillian Vine

I would like to make you aware of how much I ask of our speakers. When I originally call them to tell them we are going to have a seminar or workshop and that I would really appreciate their speaking, I also tell them several other things. The first is that we are not going to pay them and that they must cover their own expenses. Almost always they say "Fine." Then I ask a little more--I tell them I won't let them speak nearly as long as they might like to and deserve. And they also agree to that. Then I say that is not all--I want them to meet with me at 7:30 in the morning of the event. They agree to that as well. And many having done it once, even succumb to my request to speak again and often again. I am extremely grateful for their generosity.

THE MUSICIANS' CLINIC AND OTHER CLINICAL EXAMPLES

Lillian Vine

Dr John Chong is the Director of the Centre for Human Performance and Health Promotion, Sir William Osler Health Institute in Hamilton. John earned his medical degree from McMaster University in Hamilton after receiving a Bachelor of Science degree in Electrical Engineering with First Class Honours from the University of Toronto.

He achieved his ARTC in Piano Performance with First Class Honours from the Royal Conservatory of Music of Toronto while still a student in high school. He holds a Master of Science degree in Design, Measurement and Evaluation from the Department of Clinical Epidemiology and Biostatistics at McMaster University and a diploma in Occupational Health and Safety, also from McMaster. He is a Fellow of the Royal College of Physicians of Canada in Community Medicine and a Fellow of the American College of Preventive Medicine.

He is a man with expertise in many fields--repetitive strain injuries, epidemiology and biostatistics, hearing loss, educational programs and environmental health. During his undergraduate years he was a summer research scholar in the computer and electronic music laboratory, National Research Council Division of Electrical Engineering in Ottawa.

His leisure activities are as broad and varied as his professional ones. They include piano, composition, hockey and golf.

John Chong

It is a great privilege to speak to you about some interesting developments in occupational health. What I would like to do in this short time is to introduce a topic that you might be puzzled about--why are we talking about musicians in a subject that is so serious across industry? I want to present to you a snapshot of my experience with an interesting group of workers in the arts and entertainment industry in Canada.

The occupation of musician begins fairly early and there is a certain selection bias involved, as there is in the steel and auto industries. The occupation lasts a long time as well, but there is an occupational Darwinism as in all industries--a healthy worker effect; those who don't survive just disappear. We all think of the great masters of the profession but unfortunately, along the way, there is a lot of carnage and wastage in the arts and entertainment industry just as in any other industry.

The arts and entertainment industry represents a lot of the natural resources of Canada. It covers about 8% of the gross domestic product. The issues I will be addressing are therefore quite serious; they are the clinical as well as the compensation experiences within this group.

I am going to put you to work and present to you a few cases; you will try to apply them and some of the information that Dr Wells has presented and think about what Geoff Wright has presented to you and see how these cases relate to your own work.

The first case is that of a 14-year-old pianist who develops aching and fatigue in his right forearm and multiple painful bumps on the back of his right hand. There is a lot of tension in the

forearm and if you let it go long enough you will begin to see the effects of a regional inflammation--you get little bumps on the extensor tendons. You can get bumps on the wrist if the ligaments get sore or blow out. The muscle tendon units in the forearm may start to hurt as they develop little rips or knots (trigger points). There is not a lot of freedom of movement and you start to burn out the structures. In the more severe cases, you start to irritate the nerves that supply the electrical impulses; you will start to get impairment and disability of function.

Next is the case of a 33-year-old clarinetist who has noticed pain and swelling at the base of his right thumb and clicking of his right little finger for the past 6 months. There is static loading of the right thumb, because the design of the keying system of the clarinet puts a load on the right thumb. If you let the condition go, a lump will develop on the extensor mechanism of the thumb. If you can survive that long enough, even the joint and joint capsules start to go. You wiggle the little finger of the right hand a lot when playing the clarinet which puts a lot of strain on all the structures in the hand and quite commonly you will see nodules develop on the flexor tendon sheaths. If you let it go you will start to get clicking; if you let it go on longer you will get "trigger finger"--the fingers will get stuck, a very common situation. The bio-mechanical principles that Dr Wells presented to you apply very specifically--static loading, dynamic loading--within this situation.

There is a 40-year-old cellist who has complained of a throbbing pain in his right shoulder for the last year. A cellist has a lot of movement of the right upper extremity. Most cellists are fixated about bows and they are fixated about their bow grip and forget about their shoulder. There is a lot of repetitive movement of the shoulder joint. And not only playing time; the time you are not playing is important during history taking. You are lugging around the cello everywhere, which of course will blow out your right shoulder. The total work load may be 12-14 hours a day either static loading, high force, low force, high repetition, and more. The rotator cuff gets strained and there are problems with the shoulder joint--it is not a very good joint; there is a little cup on the bottom and mechanically it hangs together by muscles and tendons and they slither together with bursa and there are bones that override. Whoever designed the shoulder joint did not design it well for repetitive movement without rest.

The next case is a little more complicated--a 38-year-old violist develops numbness and tingling in the ring and little fingers of the left hand, pain in the left elbow and neck pain. There is a strange wrist position, a strange elbow position, static loading, repetitive movement. A lot of muscles in the neck are used when playing the viola; force is transmitted through and across the chin through the temporomandibular joint. The neck and shoulder positions are awkward--you must look at all angles to determine the problems. The trapezius muscle supports the whole neck and shoulder; underneath are more specific, smaller muscles that are used in proximal support which are used all the time in facilitating distal fine movement. Just wiggle your finger and you can feel a lot of muscle activity in your neck and shoulder region. The neck structures are very complex; the wiring coming out of the spinal chord comes out through little holes; there are disks that are shock absorbers between the bones. However, when you start to use your neck in odd positions, such as squeezing the body of a viola, those holes through which the nerves go start to change in terms of their diameter. Depending how you rotate, depending how you flex either laterally or forwardly, they get smaller and potentially irritate the nerves. Past the spinal column, there is the brachial plexus which is where the nerves come together and supply the whole neck and shoulder and the rest of the distal extremity. There are muscles in the neck that support the whole posture, more specifically the anterior scalenes, the pectoralis minor muscle, which grate right across those nerve bundles. They can cut at different angles depending on your posture.

These thoracic outlet syndromes are tough to diagnose, very activity dependent and very, very impairing in terms of fine hand coordination and movement.

The wires continue down below and the bottom part of the brachial plexus is draped across the first rib and ultimately turns into the ulnal nerve, which comes across the elbow and through a canal at the wrist, which wiggles when you vibrate and supplies the small muscles in the hand which gives you fine coordination. We are dealing with a very complicated set of structures and there are lot of pinch points. Very subtle changes up high give a lot of impairment below.

A 25-year-old percussionist develops numbness and tingling in the index and middle fingers of both hands, and painful wrists and forearms. This is an example of carpal tunnel syndrome. There is a lot of repetitive wrist movement, a lot of impact. If you let it go, inflammation starts, there is swelling in the flexor aspect of the wrist and forearm and it is very painful. If you leave it longer, you will starting squeezing that medial nerve at the wrist and give rise to a numbness pattern. It is a dynamic, activity-induced condition and is therefore very responsive to change--in activity, in wrist position, in repetition.

A 25-year-old pianist develops a gradual loss of control in his left middle and ring fingers, especially when doing quick ascending passages. There is no pain or numbness or tingling; he just fumbles. The first reaction is to diagnose stress, but it is called focal dystonia or occupational cramp. It is a disorder of motor programming. It is really important to treat these conditions early because it is very hard to manipulate your motor codes. Over 10% of the musicians in the clinic have focal dystonia and it is brutal because it doesn't respond to any kind of therapy.

Going back to the basics--the definition of repetitive strain injury is pain and loss of function. This is important in all occupations; but about 60% of musicians will admit that they have some type of pain or dysfunction that is upsetting their occupational performance. Common symptoms are pain during and after playing, numbness and tingling, weakness, loss of control.

Risk factors are change, change, change. Change in anything--change in teacher or instrument; change in technique; intense preparation for a performance; preparing a new and difficult repertoire; prolonged periods of performance without rest.

Intrinsic factors--there are certain people who are more at risk--those people who have weakness in certain muscle groups for the task; those who are more flexible in certain joints depending on the task; and such. Extrinsic factors are much more important--intensity, technique, repertoire, instrument.

We were having a hard time looking after a lot of these cases at Chedoke Hospital, so I got involved with a group of physicians and built the Sir William Osler Health Institute. We formulated a preventive rehabilitation/health promotion program. The physicians are involved in community and preventive medicine; orthopaedics; physical medicine; psychiatry; family medicine; occupational, physical, and athletic therapy; kinesiology; audiology; and so on. We work on groups of individuals from different occupations but we are very interested in performing artists.

The patient is referred by the family physician and a careful history is taken. It is not just a biomechanical assessment, but we talk to them to get a good assessment of who they are and what is happening to them--a very holistic approach.

In the physical examination, we look at posture, support, fine movement and poke around and look for those painful spots and clinical signs of nerve irritation. We explain everything to them as we go along; it takes time because we are dealing with a very complicated machine.

Principles of rehabilitation--we use a lot of sports medicine applications. Rest until absolutely pain-free; braces or splints; injections--this is just a beginning. You have to exercise and stretch out the muscle/tendon unit that is weak and scarred. Ultrasound or laser therapy makes a difference even though there is no scientific evidence or randomized trial evidence. A lot of clinics use these techniques and expect them to make a difference. If you look hard at the evidence, exercise does make a difference in general terms, but what and how much is really yet to be delineated.

Basic principles--hands on. You have wrecked flexors in a guitarist who squeezes his guitar pick too hard. You have to go in and beat up those injured flexors; you have to break up the scar tissue. This is very time-intensive and expensive; very skilled work. You have to stretch out the scarred muscles because they contract.

We then start to get the individual going again. We start with a very gradual increase in playing time--gradual return to work. They are not ready to return to full activities, but these people are self-employed and as soon as they get rid of the pain they go back to playing 8 hours a day. Right away the injury will recur. You have to go very slowly--just have them hold the instrument for 5 minutes a day for the next week. Continue the stretching and strengthening program. Then begins the fun and games of ergonomic modification. Was there something in the instrument that brought this about?

It is only after they are over the pain stage that they can think about the future and returning to work. We can then talk about posture, support, technique and instrument. Trying to apply those principles to the individual--this is hard. There are basic principles of healthy hand use; the way you use your hands to carry out a task can minimize the tension both in the proximal and distal extremities. Video is a fantastic tool to give the player ongoing feedback as s/he tries to re-integrate to the task.

We use a lot of group support which is very important because many of these people are out of tune with their bodies. Then we gradually mobilize them and try to get the movement pattern back together. We teach them exercises that stretch out the muscles for greater flexibility. Constructive rest is also very important.

Basic movement patterns are stored deep in our brains from day one and they don't leave us, they are only applied to the tasks presented all through our working lives. Aberrations will creep in in terms of inefficiencies as we go through life. In therapy, we try to go back to some of the basic movement patterns and bring them back in a healthy way.

Strengthening is critical, very important. A lot of the underlying factors, the effects of the injuries--the deconditioning, the muscle imbalances that occur--are very detailed. If you don't do the exercise, the pain and the injury will recur, especially in high force work. But even in static loading situations, low force/high repetition, medium repetition, the reconditioning of the muscle/tendon unit is critical. Just fixing the flexor tendon by injecting it and making it melt away is insufficient treatment.

We provide a gymnasium equipped with muscle-strengthening machines in a setting that makes the patients feel comfortable and confident. A kinesiologist supervises them and gets them back to functioning and monitors their progress. These are not your average "Gold's Gym" clients; so we provide a different environment.

The final phase is return to work. And again it is very detailed and complicated--technique, repertoire, fingering, instrument, schedule. Reinforcing the exercises and warmups to make them part of the daily routines. It is not just doing the 20-minute workout at 7:00 in the morning; it is really thinking hard about what exercises are important to the task, which muscles are used, which ones should have recuperation, which ones need to be fixed during the day. There is no fixed formula; it depends on the task, it depends on what is happening, it depends on where the individual is.

Relaxation is important--little discrete breaks to give the system a cool-down period. You would never drive your car 24 hours a day and burn it out at 7000 rpm. Nor is the human body designed to go that long; it needs recovery. Real rest breaks; not sitting doing another job like filing but proper rest breaks with exercise. We look at lifestyle issues. People who are in middle age are really obsessed about making a career, making longer CVs, and making their mortgage payments. They get totally obsessed with work. It is a good time to start questioning a lot in their life and start educating them. If they have gone through a painful experience, it makes them receptive to change. Change caused it; change can cure it.

Above all, if the injury happens again, treat it right away. You don't have to go to an internal medicine specialist and wait three months; you don't have to go to an orthopaedic surgeon and wait six months. Rest, take a break, put a little ice on the injury. When you go home, take care of it, look after yourself. Those basic sports medicine principles apply to the general population and every occupation.

Preventing overuse, implementing the strategies of rest, stretching, exercise, ergonomic principles and educating people to pay attention to their bodies and to the pain are very important. The human body is built worse than any car on the market; the idiot-lights built into our system are very poor. As soon as we feel the pain the damage has already happened; the brain is not trained to pick up these signals right away. Worst of all, because adrenaline is flowing during a performance, you usually don't feel the pain until the next day. A lot of musicians have no clue what they did the day or night before that caused the disruption the following day.

The bottom line of prevention of overuse is controlled use in a global sense. You have to look at all these issues all the time; you have to really work at it day in and day out. It is hard work.

QUESTIONS AND DISCUSSION

Joan Stevenson

That is a wonderful support program; who actually pays for it? The physician is covered through OHIP, your physiotherapy is covered through that. But where are the funds coming from for the support program?

John Chong

Everything is covered under OHIP. It is a high volume, low margin enterprise; it is a piece-work system and those set of values that are in the health care system in Ontario apply. We are no different than any other clinic. Very few musicians have disability insurance (that is one of the educational issues we get into). Extra fees go to buying a bent head joint for your flute, the splints are over and above. That is how we fund it. It is a group of physicians who leased the land from the hospital and we built the building and leased the equipment. It is not our only program, because we can't just live off musicians so we do a lot of occupational rehabilitation and a lot of motor vehicle accident rehabilitation. We use the same principles for arthritics, chronic disease models, getting people with hip replacements mobilized. The principles of rehab are not innovative, it is just how you put them together and make them responsive to the particular population. I have tried to illustrate some ideas and get you thinking when you take them back to your workplace.

Jim Gill - CAW Canada

What has been done to redesign the instruments?

John Chong

All sorts of crazy things. Take for example the flute. As an instrument it is very dangerous to the thoracic outlet mechanism and is brutal on the left arm. The macho way is to have all the keys in line instead of offset, which turns the wrist and makes it more comfortable. So it is a very dangerous instrument which you are playing 8 or 12 hours a day with your arms suspended way up--there is a lot of neck tension. Richard Norris, an American physiatrist, took the flute and bent it 30°, which brings the arms down to a comfortable position. But you can imagine the reaction among flutists--they think this is an absolute outrage.

A bassoonist was having problems abducting her little finger because she has small hands. So I suggested, very cautiously, that she go to her instrument maker to alter the key. She finally got a quote of $600 to fix the keys. She went back to her teacher who took a pair of pliers and bent the key. Since then, her problem is fixed--her hand is rebuilt, the muscles came back.

Be innovative on the shop floor; you don't need PhD's. Use some common sense and try to fix the problem yourself. If you are <u>really</u> stumped, then call in an expert.

A UNION'S VIEW ON RSI - PREVENTION AND SOLUTIONS

Lillian Vine

For the past 10 years, Gary Cwitco has been the National Coordinator for Health and Safety for the Communications and Electrical Workers of Canada. Before that, he taught at Humber College at the Centre for Labour Studies after working for the Manitoba Government as a health and safety consultant. He is a member of the National Research Council Associate Committee on Occupational Application of Ergonomic Research.

Gary, along with Dr Robert Webb and I planned the highly successful RSI Workshop in 1988 co-sponsored by CCOHS and the National Research Council Associate Committee on Ergonomics. He will be talking about the RSI experience in his own union and he will be talking about some of the outcomes of that workshop.

Gary Cwitco

Being the first speaker after lunch is always a daunting task in terms of trying to say something that will keep people interested and awake as the body deals with the digestive functions. I always attempt to be entertaining or at least provocative, and I hope that I will achieve that. But I will be watching carefully for evidence of the body overtaking the mind.

The Communications and Electrical Workers of Canada is a Canadian union representing 40,000 people primarily in the telecommunications industry and the electrical and electronic manufacturing industry. We represent people who work for both large and small employers in the service, clerical and manufacturing industries. We have, unfortunately, come to have a great deal of experience with repetitive strain injury and issues of RSI from all aspects--from prevention, from dealing with the consequences of RSI, from dealing with compensation boards and employers. I want to talk about what we see as some of the impediments to solving RSI problems from a union perspective and how we have attempted as an organization to overcome some of those impediments. The second half of my presentation will deal with what the NRC committee is doing and with one of our current projects which we hope will have a very positive impact on RSI solutions before too long.

Let me start with what I consider to be some of the important impediments to solving RSI problems.

The fundamental one, in my opinion, is that RSI is productivity-driven. Therefore, employers often see it in their interests to accept repetitive strain injuries because productivity is being increased. In our industry, we have almost always seen repetitive strain injuries following changes in technology designed to increase productivity, such as new computerized systems for telephone operators that replaced the old cord boards. After a time we began to see repetitive strain injuries. That technological change allowed for an increase in productivity in telephone operators of 300%--a significant increase. But it brought with it a whole range of problems relating to work organization which manifested themselves in a range of repetitive strain injuries. Similarly in some of our small manufacturing plants, we have seen changes in technologies in the redesign of assembly lines to produce more. We have seen more repetitive strain injuries because of the redesign of those assembly lines and the redefinition of tasks. I am not suggesting for an instant that it is in the employer's best interest to do this, but I think employers who are not thinking carefully see it as beneficial to increase productivity dramatically. When the workers or the union or consultants talk to an employer about a change in technology, the employer only sees that productivity has gone up 300% and is prepared to deal with a few more compensation cases or a few more days of absence.

The second point is convincing employers that the problem is real. When repetitive strain injuries start to appear in a workplace, there is the usual litany of responses. The first one is "You're the only one who has this problem." The second one is "This is the only line (or office) that has this problem." A variation of that is "This technology has been sold universally across North America and Europe, and no one else has experienced this kind of problem." Historically, that was always

upheld by the Compensation Board; it simply refused to pay these claims. That has turned around quite a bit in the last few years, and we are having much more success with Compensation.

With one large telecommunications employer in Ontario and Quebec, we got a brown paper envelope that included a letter from the senior manager responsible for all operator services across Ontario and Quebec. In that letter she directed her local managers to appeal every claim on RSI that was granted because, by definition, the job of telephone operator could not cause an injury. So, convincing the employer that the problem is real is a fundamental issue.

The next excuse is to blame the problem on anything but the equipment and the work organization. We find victim-blaming is alive and well in employers' sensibilities to repetitive strain injuries. Whether it is birth control pills or crocheting or knitting or genetic tendencies towards diabetes or obesity or thin wrists or any number of other causes--it is the worker's fault; the equipment couldn't possibly be the cause.

The next difficulty is that it is impossible to separate work organization issues at a psychological level from the development of repetitive strain injuries. I can't prove that, but I am prepared to bet that if the psychological environment of the workplace was improved, the incidence of repetitive strain injuries would be reduced. That is not to say that repetitive strain injuries are psychosomatic. But, in my view, there is a direct link between high-stress jobs and repetitive strain injuries.

We have had some success in dealing with most of these problems. It depends on the employer, of course. And we have engaged in a whole range of activities that are not common in industry. For example, we have had every keyboard in the long distance operation of Bell Canada fixed to remove the spring from every key and replace it with a different spring. We were getting a lot of repetitive strain injuries among operators. A long distance operator taps on a numeric keypad all day long--in fact, historically operators were trained to key with the index finger braced with the thumb with the pen or pencil across the palm of the hand. If an operator keyed with a different finger, s/he could be disciplined. When we moved from the cord board, the number of keystrokes that an operator performs significantly increased. Going from 300 calls to 1000 calls and, on average, 10 keystrokes per call under the old system to somewhere between 25 and 50 keystrokes under the new system is a significant increase. The numeric keypad is also <u>always</u> on the right hand side of the keyboard, so right-handed people who performed both the writing task and the keying task with the same hand were constantly going back and forth with the pen. We discovered that the amount of pressure required to activate the keys was great--these were very resistant springs. The operators tended to pound the keys to make the system work and the keys were bottoming out and hitting the frame of the keyboard which caused a hard shock at the end of each keystroke. That was sending vibrations back up through the finger and we were getting all kinds of problems as a result. We were successful in convincing the employer to retrofit all the keyboards, change all the springs and at the same time we introduced a new technique. We are teaching operators to use three fingers for keying rather than a single finger. It is not working very quickly because we have a lot of people with 15-20 years of service who have been keying the old way for a long time, but it is an ongoing project.

We are also experimenting with a left-handed key pad so that people have an option to use either hand. We convinced them to try the left-handed key pad on the basis that there were a lot of left-handed people in the environment; presumably it would be easier for them and they would have the option of using either hand. On an experimental basis we introduced left-handed key pads into telephone operators' offices. It was a big hit! People liked them for a number of

reasons; the most important that the key pad is cabled so it can be moved which gives operators more flexibility. The left-handed people didn't like it at all because they still write notes with their left hand and key with their right. So we ended up with a very popular intervention that didn't meet the objective for which we designed it! Now the company doesn't want to put them into all positions because they were designed to meet the needs of left-handed people and only the right-handed people liked it.

We finally convinced the employer to take the RSI problem seriously because we had a number of local health and safety committees in workplaces informing their members about repetitive strain injuries. When people had an explanation for the kind of symptoms they were having, they started to link what was going on in their bodies to what was happening in the workplace. We started to get a lot of compensation claims and we started to win a lot of compensation claims. As we started to win, the news spread, and as the news spread, reports went up and there was a greater interest in repetitive strain injuries. As a result of that interest, an ergonomic consultant was hired to look at the workplace and a number of recommendations were made, including that stationary keyboards should not have been installed in the workplace and that there should have been more adjustability in the work surfaces and tables. It was very interesting because the union had told the employer this when they bought the equipment. As soon as the equipment was installed, we said we saw some problems but got nowhere because there had been a large capital investment. The ergonomic consultant made many of the same recommendations we had made and some of the things that we see now are that the operators' new tables are fully adjustable, there are also new chairs, wrist rests, foot rests, left-handed key pads, new keyboards.

But we do not know if we have made any impact at all, because we did not count what we were doing. We don't know whether or not we have reduced the incidence by what we are doing because we don't know how many people were reporting before. Has all the activity increased the amount of reporting so that we have a better sense of the problems or is it something completely different? What we are trying to do now is design a mechanism so that we can measure whether or not the individual things we are doing or the total of what we are doing are having a positive or negative impact.

One of the areas that is not being met at all is the involvement of the workers and their representatives in the design and implementation of technological change. If I am right in my first premise that repetitive strain injuries are both productivity- and technology-driven, workers must be involved in the design of the technology. If workers are involved in the introduction of that technology into the workplace, if workers are involved in the way in which the work procedures for using the technology are developed, we will have a better chance to eliminate these problems. As long as engineers continue to design technologies for workers, as long as corporations continue to buy technologies that will be productive (and I mean productive in the old-fashioned sense of counting the number of widgets that come off the line at the end of the day) then we will continue to have these problems. As long as employers continue to treat workers as "hands" that are using the equipment rather than whole human beings who can think and are more than adjuncts of the machine, we will continue to have these problems. That is the biggest hurdle to overcome. The hurdle of suggesting to management that their traditional definition of management's right to determine the tools of the job and the way in which the job is done is wrong and that workers reasonably expect that when they come to work they will work and that they want to be productive--until managers begin to accept that principle, we will have serious problems dealing with this. If employers fail to recognize that the most important resource they have is the people whom they employ, then we will continue having problems.

Let me relate to you something that a telephone operator said to me. She said, "I have worked for this company for 25 years. When I started, we used to say that the company treated us like machines; today, we want to be treated that well." The telephone industry, while it is unique in many ways, is not unique in this respect. If you look at manufacturing industries, if you look a banking industries, if you look at a whole range of industries--you will hear lots of rhetoric about how important the employees are. But when you go onto the shop floor or the office floor and ask workers "Are you important to your boss? Does your boss really care what you think?" you will find a very different perspective.

This brings me to the project that I am engaged in as a representative of the labour movement on the National Research Council for the Occupational Application of Ergonomics Research. We co-sponsored the RSI Workshop with CCOHS in March 1988. The group of people who attended that workshop recommended to the NRC committee that we establish national guidelines for the prevention of repetitive strain injuries. We have taken that recommendation seriously. I would like to take a few minutes to explain what we have done so far and what we plan to do.

We have worked with the Institut de recherche en santé et en sécurité du travail (IRSST) for the development of a bibliography on repetitive strain injuries. That bibliography is now completed and it has approximately 1400 entries. Included in it is the abstract of the material. It is machine-readable and searchable by key words and we think it is reasonably up-to-date. We used a whole series of other mechanized data bases to search for the material; we collected all the articles. The articles were evaluated to determine whether or not they were appropriate for inclusion in the bibliography. That was Phase I of our project.

Phase II--and I am hopeful that this will proceed--the Scientific Advisory Council of the IRSST is meeting now to evaluate our project proposal to create a "Best Practice Guide" for the prevention of repetitive strain injuries in general. The proposal is to bring together a team of international scientists active in the study of repetitive strain injuries to look at the literature that has been collected. We plan to bring together a workshop of workplace parties--employers, workers who are concerned about repetitive strain injuries, plus some other researchers who have done applied research on RSI--and have them meet with our international panel to talk about what they have done in the workplace. We are then going to lock up our expert panel in a cabin somewhere in the Laurentians for a week with a few computers and some telephone lines and tell them to work on devising an outline of this manual. Then we are going to send them back to wherever they live and have them work writing their sections of the guide. About eight months later, if all goes well, we are going to bring them back together again for another week. By the end of that week we are going to have a first draft of the document. When that draft is finished, we will bring all the people from the workplace parties back together and have the scientists report on the "Best Practice Guide." If this is approved, it will be jointly funded by the IRSST and the Ontario Ministry of Labour, with the IRSST being the major funding partner.

Coming out of that work, Phase III will be to take that "Best Practice Guide" and develop a series of industry-specific guides on what should be done and how to avoid repetitive strain injuries in industry X, Y, or Z. The Manitoba Workers' Compensation Board has made a commitment to assist in the funding of Phase III.

We are very excited about this project and it came out of a recommendation from people at one of these workshops. One of the other benefits that will come out of this project will be that the gaps in the research will become clearer because we will be doing a detailed analysis about what is known. By understanding better what is known, we will be able to understand what is not known.

I am convinced that we don't know everything about the prevention of repetitive strain injuries, but I am also convinced that we know a whole lot more than we see in the workplace. If we could find the mechanism for convincing employers or designers of technology to include in what they build the knowledge that we have about the prevention of repetitive strain injuries, we could improve the situation. We are involving a number of governments in this project and my agenda, when this project is over, is to see this "Best Practice Guide" referenced as a performance regulation in health and safety regulations all across the country. That is my agenda; it is not shared by everyone and it is by no means certain that I will succeed. But I will try. We believe that this project is very positive and we are really encouraged by the initial responses we have had from the scientists we have approached.

Lillian Vine

It is very exciting to hear that a workshop of 90 or so people who got together, seriously discussed a topic they thought important and made some recommendations will soon lead to guidelines which will be available to all the people that CCOHS serves. I thinks that is terrific and certainly very rewarding.

NCR - DEALING WITH RSI AND FUTURE PLANS

Lillian Vine

Joanna Musselman graduated from McMaster University with a Bachelor of Arts degree in Sociology, then graduated with another degree in labour Studies in the first graduating class of that new program in 1983. She has worked in various government-sponsored work experience programs--Student Training in Industrial Relations, Students in Personnel. She spent 3-1/2 years working in Personnel for a manufacturing facility in the chemical industry; that was her first major exposure to health and safety in the workplace. She has been with NCR for 3 years in various functions--training, development, and she now holds the position of Manager, Benefits and Employee Relations. Safety and health remain of particular interest to her. I understand that her company is one of the proactive companies.

Joanna Musselman

I have been asked to give an overview of what NCR is doing in the area of repetitive strain injuries. Repetitive strain injuries for NCR has just recently become an issue; it is of particular interest to me and is something that I have been able to convince the Waterloo organization to take on as an issue.

NCR is a world-class organization--$6 billion in worldwide revenue; 1200 offices located throughout 130 countries; 65,000 employees worldwide. NCR/Waterloo itself is also big business--$72.5 million in revenue for the cheque-processing industry. By the time I finish this presentation, 4 million cheques will have changed hands in the world market; 400 million will have been processed in one business day; 100 billion cheques will have been processed in a year.

NCR Engineering in Waterloo is part of the NCR Corporation's Financial Systems Division. The Waterloo plant has a world mandate for the concept, development, manufacture, and support of document-processing equipment. Providing cheque-processing equipment is big business--$72.5

million revenue to Waterloo plant last year. Waterloo exports 95% of what it manufactures. Throughout the banking industry we have been able to capture 65% of the world market, 70% of the Canadian market, and 60% of the US market. Document-processing equipment is also found in the utility and insurance industries.

In 1972, 14 engineers were sent from Dayton, Ohio, to Waterloo to set up a research and development facility. By 1973, we were able to move to our present location--a 280,000 square-foot research, development and manufacturing facility located on 40 acres of land in Waterloo. We have over 600 employees, making us the largest industrial employer in Waterloo. In our manufacturing facility specifically, we have 115 full time employees who have been with the company for 12-15 years. Our turnover is virtually nonexistent. And in this time of recession when many companies are laying off, we are hiring--in our manufacturing area we have 52 recently-hired employees with less than 1 year seniority. In addition, we have over 400 employees who work in our research and development operation, in quality assurance and in administration.

In the manufacturing area, Waterloo has an assembly operation that may seem typically related to the RSI area. One machine is produced every 5 minutes. In the past, product lines tended to be driven by engineering design, which tended to make it insertion-intensive, requiring awkward motions. The product cycle was about 8-10 years. Our products of the early 1970s have been changed or eliminated or updated and our new product lines are taking on more ergonomic design features.

Why are we concerned about RSI? We are concerned about our employees. NCR involvement in the past with occupational health and safety was virtually nil. The attitude was "We are a new plant. Take a look at our nice floors. We have skylights; we have piped-in music; we have trees. It is gorgeous. What do you mean there are some health and safety problems?" Then in 1989, we took a look a some of our WCB cost claim statements and noticed that there was an increasing trend to increasing costs. It forced us to take a look at what was happening.

An analysis by the personnel department revealed that from 1986 to the present there were 26 lost-time injuries that became WCB claims specifically related to what the doctors were diagnosing as RSI--carpal tunnel syndrome, tendinitis, frozen shoulder, bursitis--and they were indicating that these injuries were being caused by the workplace. That represented 61% of all our WCB claims. The average time loss for these claims was 575 days--over 2 years. The NCR approach tended to be worker bringing in a doctor's note that s/he could not perform a function. The worker was then to call when s/he was prepared to come back to the job or until the Board pensioned him/her off. We recognized that this was a problem area and needed change. In addition, there were also 16 health-related incidents specifically related to RSI diagnoses representing over 31% of all our health care claims. The first driving force was concern for our staff.

The second driving force was cost. From 1986 to the present, costs were steadily increasing in terms of what was being paid out by the Board. In 1986, the temporary compensation claims paid out by the Board amounted to $27,000; in 1988, when you factored in some pensions that were paid out, that amount increased to over $84,000. In 1990, about a year after we had taken corrective action to start addressing this problem, our compensation claims were still high, we felt, at $40,000, but had decreased 50% from the previous year. And unfortunately, we were also paying for some past mistakes and the pensions paid out by WCB amounted to $54,000. We knew they were going to get out of control if we didn't take action. Cost/benefit analysis helped

convince senior management that there was a problem, that something had to be done, and that it had to be done immediately.

How have we responded to RSI concerns? There is a recognition at NCR that most of our concerns, most of our WCB claims and most of our concerns from the line about RSI are driven by ergonomics. We should be able to do something about it; but you can't always cost-justify major changes to labour-intensive product lines. Our product cycle is 8-10 years. It is hard to garner support to make any major product changes at the same time a particular piece of equipment is becoming obsolete; we can address it in the design stage and in the technology stage of the new products.

Historically, the NCR strategy, if you could even call it a strategy, was reactive--individual lines, individual concerns, affordable altruism. If an individual had a problem with a chair--we would buy a chair. Someone would indicate a problem with a screw--we would change some screws on a product line. Air drivers were causing a problem, the torque was not correct--we would change that air driver. We realized that that reactive approach on an individual basis was getting us into trouble and that too had to change.

So where are we going? I would like to stress that we have a very open senior management that has been supportive of all we have been doing and has been open to taking a look at our statistics and to talking about problems. Once we were able to identify this problem and get them committed to taking action, they agreed that the trouble-shooting approach of the past would not be effective to combat RSI and WCB work injury cost in the future. A task force with the responsibility of developing strategies and action plans was established and reports at least quarterly to the general manager. We are now in fact on the agenda of "key factor meetings"--these meetings for which the general manager has identified major things that he wants to be kept aware of on an ongoing bi-weekly basis.

The task force objectives were simple. We weren't trying to do anything amazing, we were just trying to identify the correct approach. We want to take a preventive approach to safety, decrease claim eligibility by not having people get hurt at work and, for those who do, reduce the number of days off through early rehabilitation. Members of the task force include representatives from all structures of our facility, both the engineering department and the manufacturing department. We have a human factors engineer, a member of the occupational health and safety committee, line managers, personnel, materials engineers, line personnel. We have developed a strategy and action plan that we believe is proactive, but we also recognize that change in the NCR environment is going to be evolutionary and incremental. We can't do everything overnight, but at least we are moving in the right direction.

In terms of the specific strategies, we have identified both short-term and long-term. We recognized our WCB claims processing as a problem; we are changing this to provide more active involvement on an ongoing basis with the individual and with the physician. Anything that a good WCB claims management process should do we have tried to do, and I think we have had some success. In 1989, absences due to work-related injuries were at 3.3%; at the end of 1990, our work-related injuries absences were down to 2.1%.

We also identified some basic training needs, both departmental training needs and general awareness. We have created a safety policy and procedures manual. We have implemented monthly formal safety meetings for each of the lines where we talk about specific concerns and provide general information.

A very exciting long-term strategy is that we are, with the assistance of the Canadian Centre for Occupational Health and Safety, developing a joint venture specifically related to repetitive strain injury. It is a computer-based, seven module program dealing with RSI, identifying occupational hazards and strategies for change. We believe that the project will be available for implementation at NCR in late summer 1991. We are working closely with CCOHS and we expect that the project will be implemented for our line managers and anyone who is directly involved initially in the design, manufacture and assembly of our products.

There have also been some workstation ergonomics on new product lines. Waterloo has captured several Canadian and American awards in industrial design, most recently the 1990 Canadian awards for Business Excellence. Our research and development facility is one of the largest in Canada. At one time, most of our design was driven by engineering and manufacturing. We saw a need to pull people together--get the line, get engineering, get manufacturing more involved in the design stages of our products. We have implemented design for manufacturing, design for assembly which are reducing the number of insertions that have to be made. Current product insertions, screw insertions went from 1200 to a little less than 700. One new product that was released in 1989 requires 42% fewer adjustments. It took 2 years, a team of up to 50 people, and over $14 million to develop it; it had the involvement of our line staff, our engineering staff, our industrial designers and our manufacturing staff.

New approaches are also taking place in the working environment. Our staff on the line work in teams. This has helped us in trying to integrate people into the kind of philosophy we are moving towards--the team approach. They are responsible for the manufacturing decisions covering their particular system and for their own quality inspections. Teams allow for job rotation. In the past individuals who had problems tended to take time off under WCB; now the teams are working with the doctors, with personnel, and with the individual to identify light duties and accommodate the restrictions that are needed so as not to aggravate an injury. Manufacturing employees have gone through extensive training in a series of ten 1-1/2 hour sessions on interpersonal skill building, team building, dealing with problems, and dealing with people and issues. All our employees complete this program before moving to the team environment.

Some years ago, our operations department implemented a preferential supplier management system that gave contracts to suppliers who were able to meet our high-quality standards. This has helped us in the area of RSI in that when we identify the problems, our suppliers are able to respond more readily to the problems as they arise.

We recognize we still have problems. We only began in 1989 and we have made some headway in two years. But we know we have a long way to go. The older lines that are coming to the end of their product cycles cannot be changed because of costs. We will fix whatever problems arise, but it is not fiscally responsible to change the whole line at this time.

It is also difficult for us to identify the sources of RSI. Many of our staff are mobile, moving from line to line, and it is hard to identify the specific problems that may be causing RSI. We have identified the need to do a job analysis on a line by line basis rather than on an as-needed basis. We are hoping to work with the Department of Kinesiology at the University of Waterloo and perhaps get a student who could do this type of analysis. An occupational therapist at the Kitchener-Waterloo rehabilitation clinic has done some job analyses for us. We have worked with the WCB on functional abilities evaluation testing to try to look at where we are going. And we recognize the need to develop and implement a modified work program, especially pressing with the changes to the WCB.

The important thing is that NCR has recognized a need, we hope early enough, in addressing the problem to make some changes now. As I mentioned, we have 20 manufacturing plants outside Canada. The pilot project that we are working on with CCOHS will be taken to some of our other manufacturing facilities and used as a positive approach to dealing with an injury that we really don't know that much about.

QUESTIONS AND DISCUSSION

Alex Chan - Canadian Automobile Workers Union, Local 1990

I was intrigued by the speakers this morning when they talked about "light duties." What has the CEW done for its members, recognizing that if you are a telephone operator and you are off on an RSI, when you go back to work there is only one job for you?

Gary Cwitco

We discourage surgery and we discourage light duty. What we attempt to do is that when people are injured, they take time off to rest, and have therapy, and we have attempted to make modifications to the work. This was one of the reasons we were so aggressive about trying to get the key pressure changed. If you are injured doing Job A, you go off to have some kind of therapy, and if you come back and do the same job, the odds are very good you will be injured again. We have been working very hard to change equipment that people use to do the job. You are right--if you are a telephone operator, then you are a telephone operator and that is the only job there is. There is no light duty; there is no modified work in that part of the company. To have an alternative job, you would have to go to another part of the company and moving from one part of the company to another is an extremely difficult process. Although we have made some major changes in collective agreements allowing movement within the collective agreement to different jobs. But it is extremely difficult and continues to be difficult; the key is to change the job--light duty for a short time and return to the job that caused the injury hasn't done anything except delay recurrence.

Dan McCarthy - Laborers International Union of North America, Local 183

I would like to ask about these industry-specific guidelines you are proposing. We have a problem in the construction industry that the context in which most ergonomic statements are made is a factory or an industrial setting. I think we have just as many repetitive strain injuries in the construction field because we are using the same tools every day. Are we actually to have something specific to the construction field instead of an industrial paradigm into which is rammed construction as in most legislation?

Gary Cwitco

What we are going to do in terms of the specific industry is look at the whole breadth of literature and see what there is relating to the construction industry. I would hazard a guess that there isn't very much. I suspect our review of the literature will show that we don't know very much about construction RSI. What we hope will come out of the review of the literature are principles that can be applied to job-specific categories. When we get to the point of developing the job-specific guidelines, we will look at a range of jobs. If it is a construction industry job, we will attempt to start from the point of a construction worker, construction employer, construction site and the variety of things done, analyse them back to the principles we have about the prevention of RSI

and then try to do a specific application of the principles to the work operations. I don't expect that there will be a lot of work done on RSI in the construction industry but if there isn't we will try to develop the general principles.

Dan McCarthy

To my knowledge, most of the literature is about jack-hammer vibration and such where it is equipment-specific but not general.

I also have a question for Joanna. When you spoke about a worker returning to the job, you spoke about identifying the light duties and giving them to that person. If you had one job with seven tasks and two were light, would you accumulate these light tasks from the others in the group and give them to the person coming back?

Joanna Musselman

This is a fairly recent approach, but in the cell environment there might be seven tasks to do and as you say some of those tasks might be able to accommodate the light duties. We just might place that person on that particular rotation for the one, two, or three weeks defined by the physician.

Dan McCarthy

My concern is that the person coming back will be absorbing most of the light duties while the other people are going to be doing all the heavy tasks. You will end up with more people off.

Joanna Musselman

Most of our work is not "heavy." The repetitive strain injuries we are experiencing seem to be from the air guns that the employees ise for screw insertions. Air drivers on certain lines might be used only in one or two applications and the individual is not even going to hit that part of the rotation for five or six weeks. I don't see this as a big problem in most of our manufacturing jobs. It could be argued, and it has been from our line managers, that if we start providing people with light duties or modified duties, they will get used to them and everyone else who has to take up the slack is going to get annoyed. We haven't experienced that at all yet.

Dan McCarthy

My concern is rather than changing the job design, you are just redistributing the work. I am not too sure that this is a long term solution. If you have seven tasks, those tasks have created the injury from which the person is suffering. There is something inherent in the tasks themselves that causes RSI and that is not being addressed.

Joanna Musselman

We recognize that we have to do a whole-line job analysis. We have in the past done it line by line as problems occur; we would address just that particular problem rather than the whole thing. Your point is well taken but we haven't experienced that yet. I think the job team concept that we have and the rotation schedules that the teams set for themselves aren't going to lead to the problems that you are suggesting.

Karin Rasmussen - Southern Ontario Newspaper Guild

I found your program of preferential suppliers with respect to ergonomic attributes and safety attributes interesting. This sort of economic fist in the velvet glove of social change has been used before in environmental policies and employment equity. What I would like to know is how the human resources department, which I assume is where this originated, presented this case to the senior managers and line managers to enforce this program? Has there been an economic sacrifice on the part of the company?

Joanna Musselman

The advance supplier management program came out of our operations department which encompasses manufacturing. It is a process that was developed that identified that we had probably 700 suppliers all over the country. The intent of going to advance supplier management was certainly not safety-related. But the personnel department and the task force have recognized a bonus from this system. For example, we had an individual who was complaining about the air drivers. There was a base plate with holes for seven screws which are inserted using an air driver. The torque on the air driver was causing some kickback. It was identified as a problem to the task force members; we checked it out with the team members and found that the supplier had changed the type of paint. The paint would stick in the holes where the screws went. Rather than wait for a whole new shipment to come in, we were able to have the supplier address the concerns immediately before it became a long term problem.

Karin Rasmussen

Gary, in an environment that is not run on a team concept but is based on the more traditional labour/management collective bargaining approach, how successful has the CEW been in negotiating provisions in collective agreements with respect to worker input in purchasing ergonomic equipment and in job design.

Gary Cwitco

We don't have any provisions in our collective agreement that give us control over purchases. We have made a concerted effort through the structure of health and safety committees with our major employers (we have had less impact with the smaller employers) about product design decisions and work organization decisions. We don't think you can separate the two, because I am convinced you can buy the best equipment in the world that has complete adjustability and if you give people a lousy job to do with that equipment that puts them in a bad posture, or you don't train them properly on the equipment, or you give them a social environment that is oppressive, you will still have injuries. At this large telecommunications company, we have a standing committee which is a subcommittee of the health and safety committee and deals with ergonomic and job design issues. Out of that committee we have done research on work organization and stress; we have done research on job design and repetitive strain injury; we have made recommendations, some of which have been accepted, on design of equipment. One of the things that we run into is a fundamental ideological position of managers of management's right to decide the equipment used and the way it is used. And when you talk about changing it, they see you as developing co-management and they are extremely fearful of that. Even when we tell them that in the long run it is going to serve their needs, I think they have a false consciousness about where their own real interest lies.

I would like to go back and give an answer as well to the question you asked about preferred suppliers. Those of you who know anything about telecommunications in this country will know that the major telecommunications company has as a subsidiary a company that supplies telecommunication equipment. You would think that the owner of the supplier company would have some influence over equipment design decisions. I spoke mainly about telephone operators, but cable splicers have serious repetitive strain injury. The main cables have 1,000 or 2,000 lines. When someone cuts through one of them, a cable splicer will have to sit in a pit in the ground and crimp all those wires back together--that is what they do all day. So we have RSI in a more construction-related position, where they are out of the plant--either up a pole or in a manhole. We have had no influence over the supplier. We have members in telephone companies that use cheque-processing equipment and complain about RSI from using this equipment. I would be interested to know if, Joanna, you get suggestions from purchasers about the design of your equipment.

Joanna Musselman

I don't have a lot of involvement in that area, but I do know that with a lot of the new products that have been mandated in the last couple of years, our product management team is talking to our customers to find out what the problems are and redesigning the equipment to meet their needs. They go through a lot of testing by bringing in the workers who will actually be using the equipment. Surprisingly enough, the place where we don't have any RSI problems is with the people who actually do the testing. Our RSI are all from the manufacturing side.

CCOHS EXPERIENCES AND ACTIVITIES

Lillian Vine

Members of CCOHS scientific staff will, in this last session, speak about CCOHS and its RSI experience, activities, and plans.

Andrew Drewczynski holds a Master of Science degree from the University of Lodz, Poland. He joined CCOHS in October 1984 as a Project Scientist in Safety Services. His field of expertise is ergonomics and physiology of work. Before joining CCOHS, he was a researcher in work physiology at the Institute of Occupational Medicine in Lodz. In that capacity, he published several scientific articles on the physical effort of physiology and the relationship between physical fitness and work potential. Before that he taught at the Academy of Medicine in Lodz and published several articles on neurophysiology.

The next speaker will be Renzo Bertolini, who joined CCOHS in 1984 as an Occupational Health Scientist. Renzo holds a doctorate in Biological Sciences from the University of Perugia, Italy. He is the author of several publications including "Carpal Tunnel Syndrome" and "Repetitive Motion Injuries." Before joining CCOHS, Renzo worked at University Hospital in London, Ontario, as a research associate.

The last speaker is Ilene Stones who joined CCOHS in 1982 as a Research Officer. She progressed to the position of Project Officer, Safety Services, in 1983 and to the position of Project Scientist, Safety Services, in 1990. Ilene has extensive experience in analysing and responding to various ergonomic information needs from a wide range of inquirers. She has published several articles

on ergonomics in magazines such as OH&S Canada, Communique, Toronto Business and Government Business. Ilene has spoken at occupational health and safety conferences and given many media interviews on this topic. She participated in the Canadian Standards Association Committee for writing "Office Ergonomics: A National Standard of Canada." Ilene is a graduate of Trent University (BSc, 1980) and of York University (MES, 1985).

Andrew Drewczynski

I will speak about CCOHS' experience with repetitive motion injuries. As you probably know, CCOHS does not produce hard data and we don't do any research. We use the information produced by other researchers to provide information to the workplace.

The Canadian Centre for Occupational Health and Safety is a national information centre that provides unbiased and confidential information on request. Our inquiries service responds to questions free of charge. Wide and easy access to this service results in over 20,000 inquiries annually. The number of inquiries increased 3,000 in 1984 to over 24,000 in 1988. The peak in that year was due to WHMIS. We now answer over 20,000 inquiries annually. Out of these inquiries, quite a few relate to repetitive strain injuries. In 1984 we had 29 inquiries relating to RSI and in 1990, 263.

My presentation deals with the ergonomic issue related to repetitive strain injuries. I will concentrate on the inquiries we receive. The most common request has been for general information about repetitive strain injuries; the next about carpal tunnel syndrome. There were quite a few questions about postural problems; very few about elbow and neck/shoulder regions.

From our records, we can assess what the Canadian working public wants to know. We assess what information is available, what research has been done, and what else is needed for workplace application. At the Centre, we assess that information and often we process it to make it more understandable to our inquirers. We customize the information, because not all our inquirers are professionals in the field and the strictly technical information would probably not be very understandable. This is why we produce some technical summaries.

The bottom line of almost every inquiry about RSI was prevention. To handle such a question, we had to develop a philosophy or a set of principles to maintain consistency in our answers. We understood, based upon the existing information, that medical treatment in RSI cases is not very effective. That led us to the conclusion that the key is prevention--rather than treat the injuries, prevent them.

As you know, RSI is a very complex issue which is not fully understood. There is a lot of conflicting information that is controversial. Even such a fundamental piece of information as what causes RSI is not clear. Certainly repetition is a prime source of repetitive strain injury; other risk factors, such as awkward posture, static loads, force, or pace are strongly associated and dependent on repetitiveness. They do not act separately; they act only in the cases where the work has a repetitive pattern.

Identification of the prime source of repetitive strain injury is the first step in developing prevention strategy. Formulating our principle for prevention strategies, we used some other very general principles. We considered the worker's safety, comfort and health as well. We treat ergonomics as fitting the workplace to the worker, not the worker to the workplace. Ergonomics quite often is defined as a discipline which fits the worker to the task and the task to the worker.

We try to emphasize only one segment of this--adjusting or fitting the workplace to the worker. The other fundamental principle is to reduce the hazard at the source. These two general principles help us to formulate a strategy which should be applied in trying to prevent RSI.

In practice all of those points should be addressed simultaneously and this is the bottom line of our philosophy on preventing repetitive strain injury. We consider training as part of a prevention strategy in the sense that we want the worker to be provided with all the information needed to allow him/her to take advantage of a good, well-designed workplace. Training is an integral component of any prevention strategy.

Renzo Bertolini

About 10 years ago, CCOHS started its activities by responding to individual questions arising from problems in Canadian workplaces. This activity known as the Inquiry Service is still very valuable and has been a very useful tool in assessing real information needs. After 10 years of experience, CCOHS is involved in many other activities created to respond to actual needs. Our activities relating to repetitive motion injuries include, among others, publications, projects, the ESSENTIALS data base, workshops and seminars, and standards.

CCOHS publications are prepared as a source of information for health and safety committees and others with an interest in understanding and reducing occupational risks. Our publications summarize scientific information in a way that is intelligible and useful to the reader. Topics for publication are chosen after careful evaluation of inquiries received in a fixed period of time. The analysis of these inquiries indicate the topics of current interest. Through the same analysis we can determine what kind of information is needed. Each of our publications undergoes several stages of review and as a part of this review representatives of workplace stakeholders, governments, employers and labour are requested to comment on the draft.

CCOHS publications on repetitive motion injuries include occupational diseases, ergonomics and workshop proceedings. CCOHS also publishes a journal called At the Centre, which contains articles representing a broad spectrum of opinion to inform and to stimulate discussion on the issues in occupational health and safety; it has carried articles on the topic.

CCOHS is developing customized packages of information to meet specific needs. At present, CCOHS and NCR Canada Limited in Waterloo are collaborating in the development of a training package to prevent and control repetitive motion injuries. The package is intended to be an interactive multimedia training package. It will consist of several modules and will use graphics and animation in combination with a very brief and easy-to-understand text. The training package aims to increase employee and employer awareness of safe practices and procedures to assist in preventing accidents and injuries.

Another project that CCOHS will develop in the near future is a training program for office workers. At present we only have an outline which spells out the components of this training program--the definition of ergonomics, identification of all the musculoskeletal problems, vision problems, stress, radiation, indoor air quality, noise and other components. The second part will analyse the causes of the problems--job design, workstations and the workplace.

The ESSENTIALS data base, as its name implies, gives you the essence of the subject--an overview. CCOHS developed this data base because the biggest problem facing people searching for information in occupational health and safety is that there is so much of it and it is sometimes

very difficult to find what is useful. So CCOHS subject specialists evaluate current knowledge and select references which provide the best overview of a topic. To assist searchers to choose those references most appropriate to their information needs, we describe each reference: what kind of information it is (background information, research results); the level at which it is written (technical, non-technical, basic or in depth).

All the references are kept current through a regular review every six months.

In 1988, CCOHS held a workshop on repetitive strain injuries. This workshop let participants explore the fullest degree of consensus possible and enhance awareness on the topic. It also gave participants an opportunity to discuss issues in occupational health and safety with labour, management, professionals and governments. Major areas of agreement were the need for information, awareness and central data; emphasis on reporting mechanisms; a need for clearer WCB policies on a national level; and emphasis on prevention and job design.

CCOHS contributed to a guideline on office ergonomics prepared by the Canadian Standards Association. CCOHS developed the section on the organization of work in job design. This clause of the guideline emphasizes that the way in which work is organized can have a direct impact on the mental and physical health of employees as well as on performance. Work organization can complement good physical design of the workplace or detract from it. Even a good ergonomically designed facility will not eliminate all the problems if workers are expected to assume one basic posture and to perform repetitive work for eight hours every day. It has been shown that health effects arising from the introduction of new office technology can be reduced dramatically if workers are given varied tasks to perform. The organization of work and job design clause deals with three key aspects--job design, work schedule and organizational changes. The other standards involve posture and chairs. CCOHS recommended the seat height and the range of adjustability for a chair to be used by working people in Canada; by reviewing six national anthropometric surveys, CCOHS identified that Canadians, both males and females, are generally shorter than Americans. The CCOHS recommendation was that the appropriate chair for working Canadians should be 36cm as a minimum seat height and this recommendation was adopted by the Canadian General Standards Board.

Looking at all these activities, you might think that, with few exceptions, they are quite ordinary or similar to those carried out by other organizations. But CCOHS activities are unique because its work is the result of agreements between representatives from industry, governments, and labour. Because of its tripartite governing Council, CCOHS information and services are perceived as unbiased and reliable. Through the Council, the quality and neutrality of our work is endorsed and supported by both industry and labour. No other health and safety organization offers this unique political balance in its governance. And by using our information, both management and labour avoid accusations of bias. Neutrality, objectivity and credibility are the hallmarks of our work.

Ilene Stones

I would like to speak to you about our new SOLUTIONS data base. This is something new for CCOHS in the last year and we are very excited about it. During the presentations today, I noticed a distinct pattern. Everybody has, in one way or another, linked their examples to actual workplaces. I would guess the reason for that is they feel the experience in the workplace is very important; it is fundamental to explaining the problems of RSI.

Continuing with what Renzo and Andrew said about inquiries, a typical inquiry might go something like this. The person calls or writes and explains that s/he has a problem and tells us all about what it is s/he wants to know. We will go to our data bases and do some research. We may find a foot-thick worth of information which is mailed to the inquirer. Then a week later s/he may call back and say s/he read everything we sent, which was very interesting, but then ask how this information can be used. S/he wants to know where to buy a certain tool or what sort of intervention has to be done in the actual workplace.

After answering 20,000 inquiries a year, we realized that there was a knowledge-application gap. We had the knowledge in many cases, but we didn't know how to apply it in the workplace. Or we knew that somebody somewhere might know, but we didn't know how to get that information to others or how to systemize it so that everyone could benefit from it. So, we came up with the idea for the SOLUTIONS data base. We are not the only ones in the world doing this; Australia, Holland, Great Britain, and several other countries are also building similar systems. However, I think ours is one of the two or three that are electronic and I think it is the only one that will be on a CD-ROM disk. Ours is certainly the only one that is looking for Canadian information from Canadian workplaces for Canadian workers.

We wanted SOLUTIONS to be a collection of case histories of actual workplace problems and how they were solved. We don't want all sorts of examples from research--that has its place and its use, and we recognize that it is very important, but in this case we want actual workplace examples. Right now SOLUTIONS is in a prototype form. We are collecting records and I will be making a plea to you to give us a few records of actual problems that you have been solving in your workplaces. SOLUTIONS will be available on the fifth disc in the CCINFOdisc series--which is called the publications disc--sometime later this year.

A record consists of identification of where it came from so that a user who wants to can contact a contributor. Then there is some information about the workplace--what type of industry, what kind of operation, how many people were involved; something about the process that normally occurs so the reader can get an understanding of what is supposed to happen; a description of the problem; we would like to see any sort of data that might have been collected about the problem such as injury rate and what kinds of injuries; then we go into detail about the solution. The solution could be any type from engineering to administrative. We want to know about the materials or equipment that were used so that the reader can understand how you went about solving this problem and what sorts of things you used. In some cases we will get specific direction as to where the materials were bought and how much they cost. We would like as much information as we can get about the effectiveness of the solution and whether or not injury rates increased or decreased, whether the employees were satisfied, what sorts of feedback was received.

The idea surrounding this data base is not to take this information and identically replicate it in your workplace. But you can take the idea and work on it to fit your situation and try to avoid re-inventing the wheel. These companies have already worked out many of the problems and you can start where they left off.

If you would like to contribute, we have developed an information package which includes a simple, straight-forward form. You use the form as a guide; we anticipate that if more detail is required you will put it there. You will have to use your common sense about how much we will need to know to make this solution usable by other people. We wanted to develop a form to give

people some guidance and not have it seem a huge academic exercise. Many of these solutions are very simple and straight-forward.

As part of the process of developing this data base, together with our Executive Board and Information Policy Committee, we have come up with criteria which we ask people to comply with as one way of assuring that the information in this data base is relevant, accurate and useful to the people who would be using our disc. Every record must relate to health and safety; it must identify a specific problem, the solution implemented and the results achieved; it has to be complete and understandable; it has to provide practical and usable information; it cannot be solely a vehicle for product vendor information; it has to conform to occupational health and safety principles; it cannot be detrimental to the interests of workers or employers in the workplace; and it must have been implemented with consultation between workers and employers.

Some of the advantages of using SOLUTIONS are that it makes this kind of information much more systematic. In the past it has been much dependent on word of mouth. This disc will be easy to search--each record will be key-worded by a professional to ensure consistency by occupation, industry and nature of injury. Eventually you will be able to go into the data base, enter "repetitive strain injury" and you will see thousands of records on how to solve repetitive strain injury problems.

One other advantage for the contributor is that SOLUTIONS will help contributors organize their own information in a way that is systematic and accessible. It will be useful to you, your colleagues, and their descendants.

Sharing on the SOLUTIONS database your information about your industry's problems and your industry's experience of solving those problems will entice individuals in other industries to start contributing. One of the things we have learned is that a problem and a solution that happen in one industry can be similar to a problem happening in another industry. The goal is to connect these two industries so they can each benefit from the other's solutions.

I would like to end with a plea. We are very excited about this data base. It is something new and different; there is nothing else like it in our series and I don't think there is anything else quite like it in Canada. It is being done internationally and through cooperative efforts with other countries we will be able to capture that information as well. But we need Canadian data and we at CCOHS can't invent it; we need an exchange of information. If you have potential SOLUTIONS records sitting in your workplace, please take a few forms and send them in to us and we will work hard at making the information available to others with the goal of improving health and safety in the workplace.

CONCLUSION

Lillian Vine

Sharing is what we have been doing at CCOHS since the day we began. I want to say thank you to all of you because these seminars and workshops are about sharing. You heard today some of the results of what I think is going to be a fantastic Canadian development; it comes out of the recommendations from a CCOHS/NRC workshop for "the associate committee to develop guidelines and for CCOHS to make them widely usable and accessible to Canadians. I would like

to thank those of you who have come here and shared today with us. Many of you have been here before; I am delighted to see you again. Many of you are here for the first time; I will be delighted to see you again. One of the things people say they find very useful at our workshops and seminars is sharing with each other--a lot of contacts have been made and maintained. Thank you so much for coming; I hope we will see you at another CCOHS seminar or workshop very soon.

APPENDIX A

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ADJUDICATION OF CLAIMS BY PROVINCE
FOR REPETITIVE MOTION INJURIES

Province	Name of Disorder	Occupational Factors	Source of Information
Prince Edward Island	a)Bursitis	Any process involving continuous rubbing, pressure or vibration of the parts affected.	Workers' Compensation Act Schedule
	b)Carpal tunnel syndrome, tendinitis, tenosynovitis	Individual basis. Claims are accepted if the work aggravates or causes the condition itself.	Personal contact with WCB.
	c)Ganglion	Trauma; heavy repetitive movement	Personal contact with WCB.
Nova Scotia	a)Tenosynovitis (simple)	Any process involving constantly repeated vibration or excessive use of muscles of arm, forearm, hand, leg, ankle or foot.	Workers' Compensation Act Schedule A Industrial Diseases.
	b)Acute bursitis over the elbow (Miner's beat elbow)	Mining	Workers' Compensation Act Schedule A Industrial Diseases
	c)Carpal tunnel syndrome, bursitis, tendinitis	Individual basis. Adjudicated according to medical condition and job description. Some change in employment to precipitate disablement claim (increased work-load, change in work).	Personal contact with WCB.
	d)Ganglion	Accepted if direct blow to tendon sheath, developing after several weeks. Ganglion not considered repetitive strain injury.	Personal contact with WCB.

Province	Name of Disorder	Occupational Factors	Source of Information
Newfoundland	a)Tendinitis, tenosynovitis, bursitis	Acknowledged to be the result of work activity, mainly heavy manual labour. Direct work involvement.	Personal contact with WCB.
	b)Carpal tunnel syndrome	Individual basis. Causal relation between work activity and diagnosis. Some change in employment to precipitate disablement (increased work load, change in work).	Personal contact with WCB.
	c)Ganglion	Not considered repetitive strain injury. Only accepted on evidence of trauma.	Personal contact with WCB.
New Brunswick	a)Bursitis of the prepatellar or of the olecranon bursa	Nature of employment.	Workers' Compensation Act
	b)Tendinitis, carpal tunnel syndrome.	Individual basis. Adjudicated according to medical condition and job description.	Personal contact with WCB.
	c)Ganglion	Trauma; heavy repetitive movement.	Personal contact with WCB.
Quebec	a)Muscular-skeletal lesions manifested by objective signs (bursitis, tendinitis, tenosynovitis epicondylitis)	Any work involving repeated movements or pressures over an extended period of time.	Workmen's Compensation Act. Occupational Diseases Regulation. Schedule 1

However a worker having contracted a disease not listed in Schedule 1 (e.g. carpal tunnel syndrome) out of or in the course of employment and not as a result of an industrial accident or of an injury or disease caused by such an accident is deemed to have contracted an occupational disease if he satisfies the Commission that his disease is characteristic of work he has done or is directly related to the risk peculiar to that work.

CCOHS/CCHST

Province	Name of Disorder	Occupational Factors	Source of Information
Ontario	a)Tenosynovitis, bursitis		Workers' Compensation Act Schedule 3.
	b)Carpal tunnel syndrome, tendinitis	Causal relation between work performed and diagnosis. Some change in employment to precipitate disablement claim (increased work load, change in work).	Personal contact with WCB.
	c)Ganglion	Trauma; heavy repetitive movement.	Section 1(1)(a) of the Act.
Manitoba	Tendinitis, tenosynovitis, bursitis, carpal tunnel syndrome, ganglion	Individual basis. Adjudicated according to medical condition and job description.	Personal contact with WCB. Section I, Subsection I.
Saskatchewan	Tendinitis, tenosynovitis, bursitis, carpal tunnel syndrome, ganglion	Individual basis. Adjudicated according to medical condition and job description. Do accept claims on an "aggravation basis", depending on situation concerning the aggravation itself.	Personal contact with WCB.
Alberta	Tendinitis, tenosynovitis, bursitis, carpal tunnel syndrome, ganglion	Individual basis. Adjudicated according to medical condition and job description. Do accept claims on an "aggravation" basis, depending on situation concerning the aggravation itself.	Personal contact with WCB.
British Columbia	a)Tendinitis, tenosynovitis	Where unaccustomed and repetitive use of the affected arm, hand, leg or foot is required.	Workers' Compensation Act Schedule B, Section 6 (3). Personal contact with WCB.
	b)Bursitis	Where there is excessive friction, rubbing or pressure on the bursa involved.	Workers' Compensation Act Schedule B, Section 6 (3). Personal contact with WCB.
	c)Carpal tunnel syndrome		Workers' Compensation Act Part 1: Section (5) Personal contact with WCB.
	d)Ganglion	Only allowed under unique circumstances.	Personal contact with WCB.

Province	Name of Disorder	Occupational Factors	Source of Information
Northwest Territories	a)Tendinitis, tenosynovitis, carpal tunnel syndrome, bursitis	Require complete work history and medical documentation. Classified as progressive non-traumatic injury.	Personal contact with WCB.
	b)Ganglion	Accepted as result of direct trauma. Excessive strain considered.	Personal contact with WCB.
Yukon	a)Tendinitis, tenosynovitis, carpal tunnel syndrome, bursitis	Require complete work history and medical documentation.	Personal contact with WCB.
	b)Ganglion	Accepted as trauma. Excessive strain considered.	Personal contact with WCB.

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